

Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/ Center-TRACON Automation System (CTAS)

APPENDIX A: Detailed Listing of Analysis Data

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APPENDIX A

A.0 Introduction to Appendix

This Appendix is a supplement to *Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/Center-TRACON Automation System (CTAS), DOT/FAA/CT-TN99/10*. Appendix A contains summary tables, charts and statistical tests selected to evaluate the URET and CTAS trajectory modeling tools. Section A.0.1 provides a summary and Section A.0.2 a description of the summary tables and the statistical charts in the Appendix A. Section A.0.3 describes the JMP charts. Section A.0.4 describes the statistical tests used in the analysis. Section A.0.5 provides a list of references for Appendix A.0.

A.0.1 Appendix Layout

The Appendix A is ordered by trajectory modeler and by the four categories analyzed in the report – look ahead time, flight type, horizontal and vertical phase of flight. Table A.0-1 shows the Appendix A layout and the charts and statistical tests for each section.

Table A.0-1: Appendix Tables and Statistical Tests by Trajectory Modeler

Section A.1 URET	Section A.2 CTAS
A.1.1 Look Ahead Time Summary Tables Statistical Tests Box Plots and Histograms	A.2.1 Look Ahead Time Summary Tables Statistical Tests Box Plots and Histograms
A.1.2 Flight Type Summary Table Statistical Tests	A.2.2 Flight Type Summary Table Statistical Tests
A.1.3 Horizontal Phase of Flight Summary Table Statistical Tests	A.2.3 Horizontal Phase of Flight Summary Table Statistical Tests
A.1.4 Vertical Phase of Flight Summary Table Statistical Tests	A.2.4 Vertical Phase of Flight Summary Table Statistical Tests

A.0.2 Description of Summary Tables and Statistical Tests

Summary Tables

Each Appendix A section begins with a set of tables providing summary statistics for the four basic errors analyzed in the report – horizontal, lateral, longitudinal and vertical prediction error. Statistics include the sample quantity, error mean, error standard deviation, maximum and minimum values for the four errors and their absolute values as well. Figure A.0-1 shows the summary table format. This specific table is for the look ahead time category and the column headers are look ahead time in increments of 300 seconds. Other summary tables include a second set of group categories listed in the column headers. The column header for flight type has the categories OVR (over flights), ARR (arrivals), DEP (departures), and INR (internals). The column header for the horizontal phase of flight table has Turn (TRN) and Straight (STR). The table for vertical phase of flight has Level (LEV), Ascent (ASC), and Descent (DES). The left hand column of each summary table is grouped by error statistic. The order from top to bottom is horizontal error, lateral error, absolute lateral error, longitudinal error, absolute longitudinal error, vertical error, absolute vertical error, and slant range error. The order of statistics within each error group is average error, standard deviation, maximum and minimum error.

Look Ahead Time (sec)	0	300	600	900	1200	1500	1800
Sample Quantity	35928	29799	23964	18529	13836	9678	6444
Avg. Horz. Error	1.2	3.16	5.11	6.82	8.25	9.36	10.17
Stddev. Horz. Error	1.08	3.4	5.47	7.28	8.89	10.1	10.9
Max. Horz. Error	42.39	84.31	125.68	167.79	173.62	156.35	169.84
Min. Horz. Error	0	0.01	0.02	0.02	0.02	0.01	0.04
Avg. Lat. Error	-0.02	-0.1	-0.17	-0.21	-0.21	-0.24	-0.22
Stddev. Lat. Error	1.34	3.64	5.43	6.98	8.41	9.49	10.06
Max. Lat. Error	32.23	65.49	97.45	129.48	134.87	120.34	117.09
Min. Lat. Error	-16	-39.47	-61.74	-94.55	-124.94	-143.49	-155.99
Avg. Abs. Lat. Error	0.87	1.98	2.86	3.59	4.16	4.58	4.74
Stddev. Abs. Lat. Error	1.02	3.06	4.62	5.99	7.31	8.32	8.87
Max. Abs. Lat. Error	32.23	65.49	97.45	129.48	134.87	143.49	155.99
Min. Abs. Lat. Error	0	0	0	0	0	0	0
Avg. Long. Error	-0.02	0.09	0.36	0.52	0.69	0.79	0.88
Stddev. Long. Error	0.91	2.87	5.13	7.11	8.71	9.94	10.96
Max. Long. Error	11.93	25.52	91.73	94.25	96.16	97.63	98.01
Min. Long. Error	-27.53	-65.39	-79.36	-106.71	-109.33	-99.82	-78.53
Avg. Abs. Long. Error	0.61	1.88	3.31	4.6	5.73	6.64	7.42
Stddev. Abs. Long. Error	0.67	2.17	3.94	5.44	6.59	7.43	8.12
Max. Abs. Long. Error	27.53	65.39	91.73	106.71	109.33	99.82	98.01
Min. Abs. Long. Error	0	0	0	0	0	0	0
Avg. Vert. Error	49.36	-6.95	-126.58	-183.49	-200.71	-273.61	-327.15
Stddev. Vert. Error	662.94	1613.04	1960.92	2006.64	2113.7	2218.71	2298.25
Max. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Vert. Error	-6824.15	-12626.9	-15373.8	-16419.3	-15900	-17219.3	-15800
Avg. Abs. Vert. Error	204.12	735.26	917.9	945.74	990.05	1065.64	1099.49
Stddev. Abs. Vert. Error	632.66	1435.73	1737.43	1779.27	1878.23	1965.15	2044.49
Max. Abs. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Abs. Vert. Error	0	0	0	0	0	0	0
Avg. Slant Range Error	1.21	3.18	5.12	6.84	8.26	9.37	10.18
Stddev. Slant Range Error	1.09	3.39	5.46	7.27	8.88	10.09	10.89
Max. Slant Range Error	42.39	84.34	125.72	167.86	173.7	156.48	169.84
Min. Slant Range Error	0	0.01	0.02	0.03	0.02	0.01	0.04

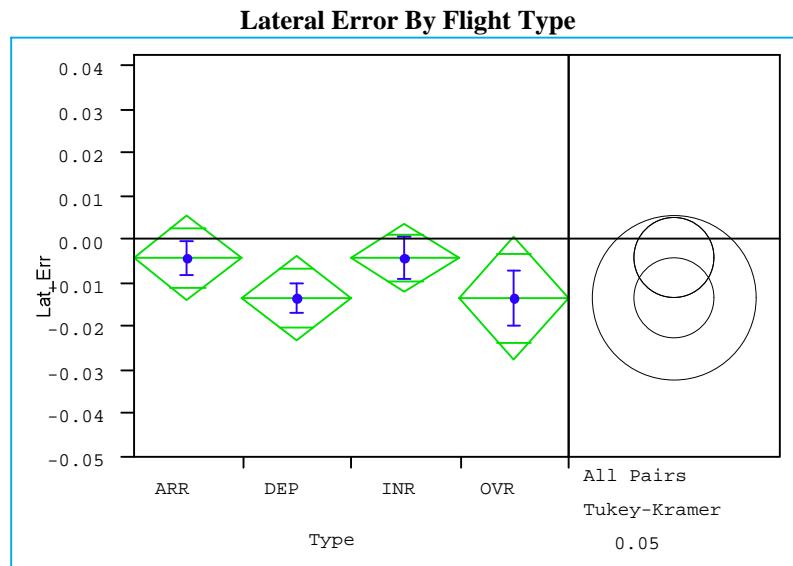
Figure A.0-1: Example of Summary Table

Charts and Statistical Tests

The statistical package used was SAS-JMP by Statistical Analysis Systems (SAS Institute, 1995).

The common graphical approach in each section was to plot the mean error by each factor. Figure A.0-2 on the following page shows a typical plot for the flight type category. The measured error in this plot is lateral error and the categories along the horizontal axis are Arrivals, Departures, Internals and Overflights. A detailed description of the chart components is provided in Section A.0.3.

Below the plot in Figure A.0-2 is numerical information provided by the JMP package including the mean and standard deviation of the error and the three statistical tests selected to analyze the data. The three tests are the Tukey-Kramer HSD (i.e. Honestly Significant Difference) Test, the Levene Test, and the Welch Test. Additional information on each test is provided in Section A.0.3.



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	8185	0.001265	0.395929	0.00438
DEP	7976	-0.00456	0.346604	0.00388
INR	12651	0.004980	0.555031	0.00493
OVR	3747	-0.00662	0.393963	0.00644

Dif=Mean[i]-Mean[j]	Means Comparisons			
	INR	ARR	DEP	OVR
INR	0.000000	0.003715	0.009536	0.011603
ARR	-0.00372	0.000000	0.005821	0.007887
DEP	-0.00954	-0.00582	0.000000	0.002067
OVR	-0.0116	-0.00789	-0.00207	0.000000

Alpha=

0.05

Comparisons for all pairs using Tukey-Kramer HSD

$q^* = 2.56916$

Abs(Dif)-LSD	INR	ARR	DEP	OVR
INR	-0.01468	-0.01284	-0.00715	-0.01011
ARR	-0.01284	-0.01825	-0.01254	-0.01514
DEP	-0.00715	-0.01254	-0.01848	-0.02105
OVR	-0.01011	-0.01514	-0.02105	-0.02697

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
ARR	8185	0.395929		0.1264577	0.1264098
DEP	7976	0.3466043		0.1027734	0.1024725
INR	12651	0.5550314		0.1533673	0.1527684
OVR	3747	0.3939632		0.0873013	0.0864671

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.1363	3	32555	0.0243
Brown-Forsythe	33.9400	3	32555	<.0001
Levene	34.0393	3	32555	<.0001
Bartlett	856.3893	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.1128	3	13778	0.3424

Figure A.0-2: Example of JMP Chart for Group Comparison of the Means

A.0.3 Description of JMP Charts

Graphical analysis of the mean error for each category (i.e. look ahead time, flight type, horizontal phase of flight, and vertical phase of flight) display plots that included quantile box plots, means diamonds, error bars and comparison circles, and histograms with outlier box plots.

Quantile Box Plot

The quantile box plot is a “fit y by x” plot used in the analysis of horizontal, lateral, longitudinal and vertical error by look ahead time. The selected JMP plot options include display of connected means dots and quantile boxes. Figure A.0-3 is a typical plot showing horizontal error at each look ahead time. Figure A.0-4 provides a detailed description of the plot components.

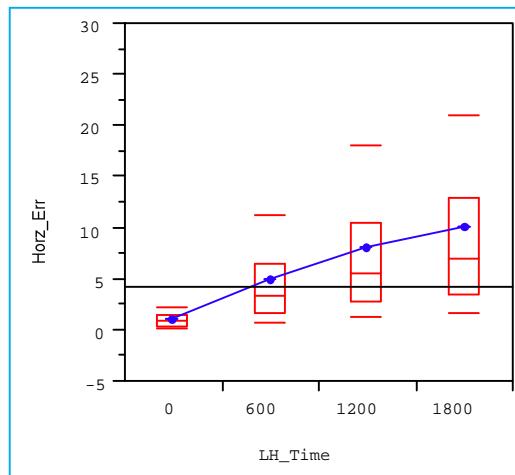


Figure A.0-3: Connected Means and Quantile Box Plot

Figure A.0-4 is a portion of the above plot and identifies the plot components. A horizontal line representing the grand mean for all observations, the means connected by dots, the median and various quantiles for each group are shown.

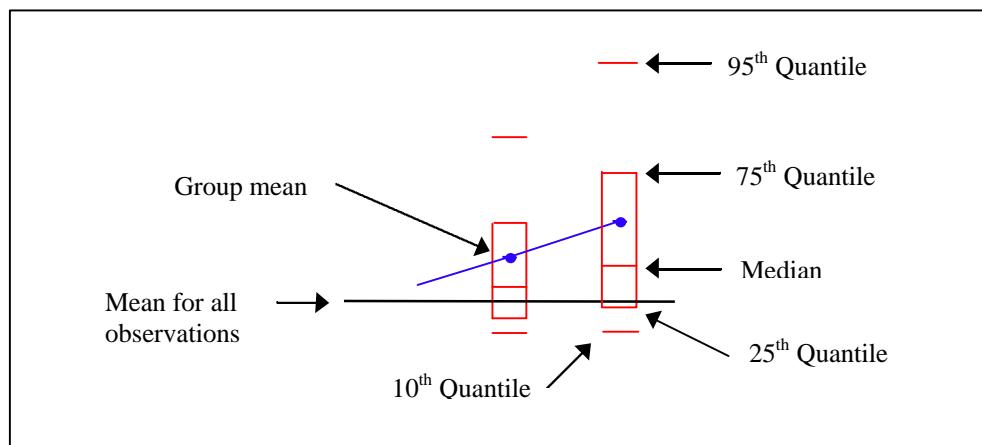


Figure A.0-4: Components of JMP Means and Quantile Box Plot

Means Diamonds and T-K Comparison Circles

Figure A.0-5 is a typical JMP plot option used to graphically present summary statistics and the Tukey-Kramer (T-K) Test. The left portion of the chart shows means diamonds, means dots with error bars. The right portion shows the T-K means comparison circles. A detailed description of the plot components is provided below.

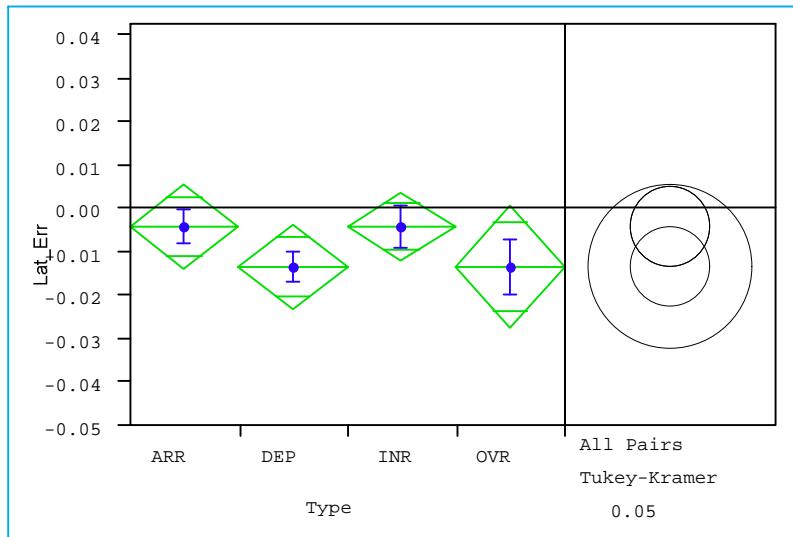


Figure A.0-5: Means Diamonds and Tukey-Kramer Significance Test

Means Diamonds, Means Dots and Error Bars

Figure A.0-6 identifies the components of the JMP mean diamond plot option. Mean diamonds are a schematic of the mean and standard error of the mean for each sample group. The green colored horizontal line across each diamond represents the group mean. The height of each diamond represents the 95% confidence interval for the group. The diamond's width for this study is equivalent for all groups for display purposes, however JMP defaults the diamond's width to be proportional to the group sample size. The blue colored dots represent the group means and the blue colored vertical bars represent one standard error (STD / \sqrt{n}) above and below each group mean. The horizontal line crossing several diamonds represents the mean for all observations.

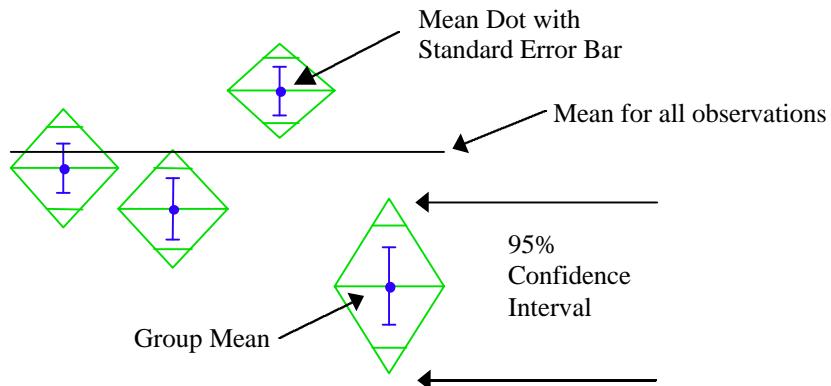


Figure A.0-6: Components of Means Diamonds Plot Option

Means Comparison Circles

JMP provides comparison circles as a graphical representation for the Tukey-Kramer Test. The comparison circle radius is calculated as follows.

$$\text{Radius} = \hat{u}_i + |q^*| \hat{S} \sqrt{n_i^{-1}} \quad \text{Equation A.0-1}$$

where,

\hat{u}_i is the group mean

q^* is a test value similar to the Student t provided by JMP

\hat{S} is the group standard deviation

n_i is the group sample size

By the Pythagorean theorem, a pair of means can be inferred to be significantly different if either circles do not overlap, or if they do overlap, the outer angle formed by the tangent lines through the point at which the circles intersect is greater than 90 degrees. Figure A.0-7 displays this test geometry (SAS Institute, 1995).

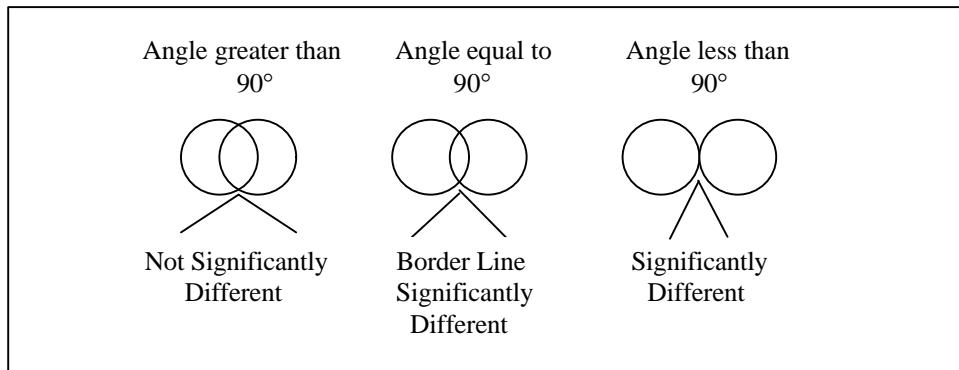


Figure A.0-7: Geometry for JMP representation of Tukey-Kramer Comparison Circles

Figure A.0-8 displays the connection between the mean diamonds and the comparison circles. Each diamond is represented by a circle. Each circle is vertically centered at the group mean and drawn with a radius as described above. An analysis of the circles in this example indicates that none of the factors are significantly different. This is illustrated by overlapping circles in Figure A0-8.

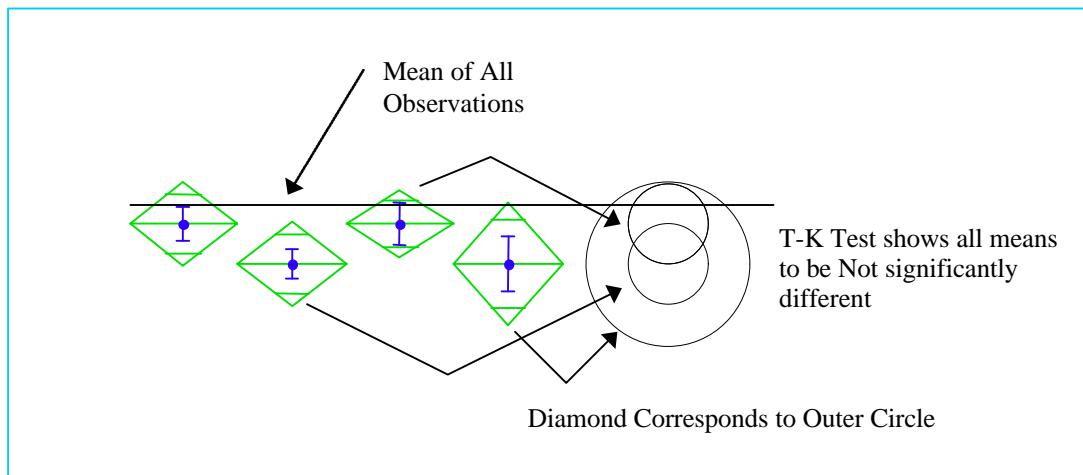


Figure A.0-8: Connection between Means Diamonds and Comparison Circles

Histograms and Outlier Box Plots

Figure A.0-9 shows a combination histogram and outlier box plot option provided by JMP. This example plot is specifically for lateral error at look ahead time zero for flights at all altitudes. Histograms were plotted for each error for each look ahead time category only.

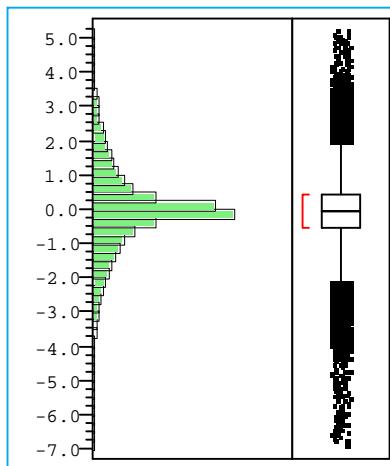


Figure A.0-9: Histogram and Outlier Plot

Additional description of the histogram is not required beyond indicating that the error variable for the data set is continuous and that the axis is therefore broken into intervals. The height of each bar indicates the relative frequency for the interval. Figure A.0-10 defines the components for the outlier box plot.

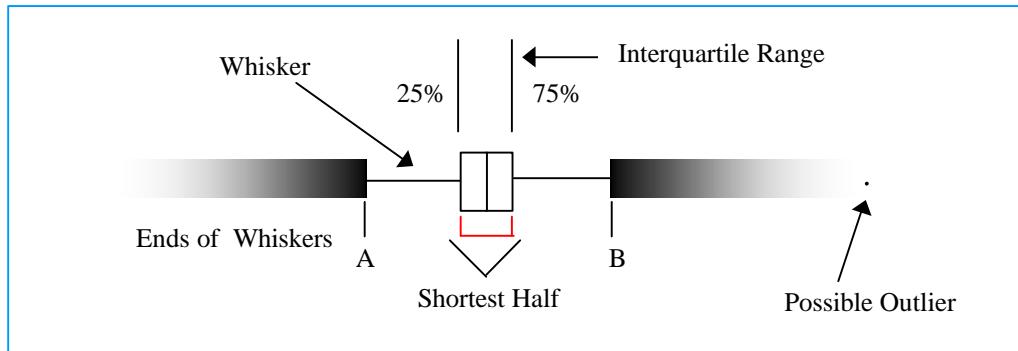


Figure A.0-10: Outlier Box Plot

Definitions for the components in the above Figure A.0-10 are as follows. The center box encompasses 50 percent of the sample data – the left and right ends demarcate the 25 percent and 75 percent quartile. The centerline of the box represents the median sample value. The ends of the whiskers (A and B) are the outer-most data points from their respective quartiles that fall within the distance computed as 1.5 times the interquartile range. The bracket along the edge of the box identifies the shortest half or the most dense 50 percent of the observations. The outlier is a possible extreme value.

A.0.4 Description of Statistical Tests

The statistical tests selected from the JMP package to evaluate the error data were the Tukey-Kramer Test, the Levene Test, and the Welch Test. A brief description of each follows.

Tukey-Kramer Test

The Tukey-Kramer method is used to compare means having unequal sample sizes. The approximate simultaneous confidence intervals for all pairwise differences are calculated as

$$\text{Confidence Interval} = \bar{u}_i - \bar{u}_j \pm q^* |\hat{\mathbf{s}} \sqrt{n_i^{-1} + n_j^{-1}}} \quad \text{Equation A.0-2}$$

where,

q^* is the critical value such that the coverage probability equals $1 - \alpha$ percent

The q^* is the quantile used to scale the LSD's and has a computational role comparable to the t in the Student's Distribution.

Figure A.0-11 shows the JMP format for the Tukey-Kramer Test. Positive values in any intersection indicates that pairs of means are significantly different. The α significance level and q^* are provided. The tables values represent the actual absolute difference in the means minus the LSD, which is the

difference that would be significant. The more significantly different means are located in the northeast and southwest corners of the table (SAS Institute, 1995).

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
$q^* = 2.56916$								
Abs(Dif)-LSD	INR	ARR	DEP	OVR				
INR	-0.02743	-0.00266	0.010011	0.017529				
ARR	-0.00266	-0.0341	-0.02141	-0.01321				
DEP	0.010011	-0.02141	-0.03455	-0.02631				
OVR	0.017529	-0.01321	-0.02631	-0.0504				
Positive values show pairs of means that are significantly different.								

Figure A.0-11: Typical JMP Table for Tukey-Kramer HSD Test

Levene Test

The Levene method is a nonparametric ANOVA technique applied when the data is non-normally distributed and have unequal variances. This method is carried out on the absolute difference between observations and the group mean defined as Z_{ij} rather than each observation, y_{ij} .

$$Z_{ij} = |y_{ij} - \bar{y}_{.j}| \quad i = 1, 2, \dots, n_j; \quad j = 1, 2, \dots, g$$

Equation A.0-3

where,

n is the number of observations within a group

g is the number of group means in the comparison

The test statistic is the F-ratio with $(g-1)$ and $(n-g)$ degrees of freedom. The JMP test result is given as the p-value. Figure A.0-12 shows the typical results format (Neter, 1996).

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.5146	3	32555	0.6722
Brown-Forsythe	3.8946	3	32555	0.0086
Levene	5.3436	3	32555	0.0011
Bartlett	174.2707	3	?	<.0001

Figure A.0-12: Typical JMP Table for Levene and Additional Tests

Welch Test

The Welch Test is another ANOVA test for the equality of group means allowing that the group variances and sample sizes may be unequal. Figure A.0-13 shows the JMP format for the Welch Test.

Welch Anova testing Means Equal, allowing Std's Not Equal			
F Ratio	DF Num	DF Den	Prob>F
6.4294	3	13550	0.0002

Figure A.0-13: Typical JMP Table for Welch Test

The typical statistical F-ratio used to test the hypothesis that the means are equal is calculated for the Welch Test as follows (Kelton and Law, 1991),

$$F = \frac{\left[\sum_i w_i (\bar{y}_{i.} - \tilde{y}_{..})^2 \right]}{k-1} \quad \text{Equation A.0-4}$$

$$\left\{ 1 + \frac{2(k-2)}{k^2-1} \left[\sum_i \frac{\left(1 - \frac{w_i}{u}\right)^2}{n_i - 1} \right] \right\}$$

where,

$$w_i = \frac{n_i}{s_i^2}$$

$$u = \sum_i w_i$$

$$\tilde{y}_{..} = \sum \frac{w_i \bar{y}_{i.}}{u}$$

and,

k is the number of sample groups

n_i is the sample count of the i th group

s_i^2 is the response sample variance for the i th group

$\bar{y}_{i.}$ is the mean response for the i th group

The degrees of freedom for the test statistic numerator and denominator are calculated as follows,

$$\text{DF Num} = k - 1$$

Equation A.0-5

$$\text{DF Den} = \frac{1}{\left(\frac{3}{k^2 - 1}\right) \left[\sum_i \frac{\left(\frac{w_i}{u}\right)^2}{n_i - 1} \right]} \quad \text{Equation A.0-6}$$

A.0.5 References for Appendix Introduction

Devore, J., *Probability and Statistics for Engineering and the Sciences*, Duxbury Press, 1995.

Kelton, D., Law, A., *Simulation Modeling And Analysis, Second Edition*, McGraw-Hill, Incorporated, New York, 1991.

Neter, John, et Al., *Applied Linear Regression Models, Third Edition*, Irwin, 1996.

SAS Institute, *JMP Statistics and Graphics Guide, Version 3, JMP Software Package*, 1995.

A.1 URET

A.1.1 Look Ahead Time

A.1.1.1 Summary Tables

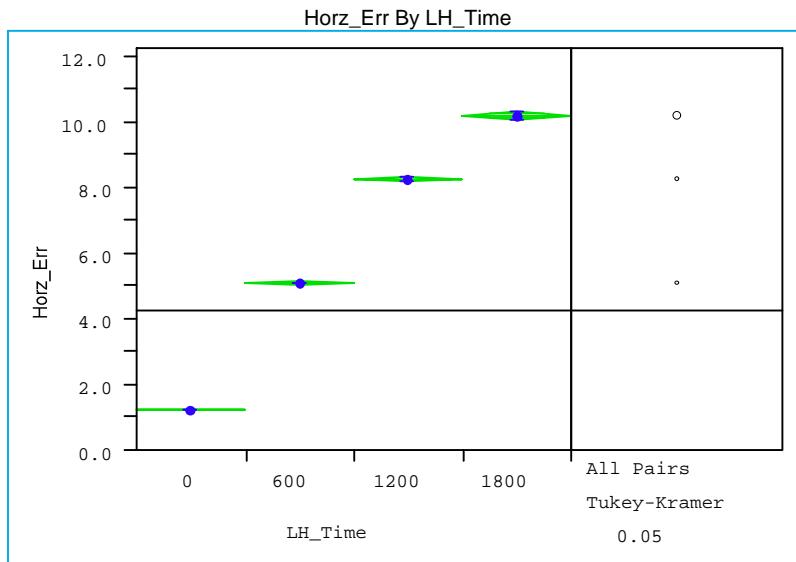
Look Ahead Time (sec)	0	300	600	900	1200	1500	1800
Sample Quantity	35928	29799	23964	18529	13836	9678	6444
Avg. Horz. Error	1.2	3.16	5.11	6.82	8.25	9.36	10.17
Stddev. Horz. Error	1.08	3.4	5.47	7.28	8.89	10.1	10.9
Max. Horz. Error	42.39	84.31	125.68	167.79	173.62	156.35	169.84
Min. Horz. Error	0	0.01	0.02	0.02	0.02	0.01	0.04
Avg. Lat. Error	-0.02	-0.1	-0.17	-0.21	-0.21	-0.24	-0.22
Stddev. Lat. Error	1.34	3.64	5.43	6.98	8.41	9.49	10.06
Max. Lat. Error	32.23	65.49	97.45	129.48	134.87	120.34	117.09
Min. Lat. Error	-16	-39.47	-61.74	-94.55	-124.94	-143.49	-155.99
Avg. Abs. Lat. Error	0.87	1.98	2.86	3.59	4.16	4.58	4.74
Stddev. Abs. Lat. Error	1.02	3.06	4.62	5.99	7.31	8.32	8.87
Max. Abs. Lat. Error	32.23	65.49	97.45	129.48	134.87	143.49	155.99
Min. Abs. Lat. Error	0	0	0	0	0	0	0
Avg. Long. Error	-0.02	0.09	0.36	0.52	0.69	0.79	0.88
Stddev. Long. Error	0.91	2.87	5.13	7.11	8.71	9.94	10.96
Max. Long. Error	11.93	25.52	91.73	94.25	96.16	97.63	98.01
Min. Long. Error	-27.53	-65.39	-79.36	-106.71	-109.33	-99.82	-78.53
Avg. Abs. Long. Error	0.61	1.88	3.31	4.6	5.73	6.64	7.42
Stddev. Abs. Long. Error	0.67	2.17	3.94	5.44	6.59	7.43	8.12
Max. Abs. Long. Error	27.53	65.39	91.73	106.71	109.33	99.82	98.01
Min. Abs. Long. Error	0	0	0	0	0	0	0
Avg. Vert. Error	49.36	-6.95	-126.58	-183.49	-200.71	-273.61	-327.15
Stddev. Vert. Error	662.94	1613.04	1960.92	2006.64	2113.7	2218.71	2298.25
Max. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Vert. Error	-6824.15	-12626.9	-15373.8	-16419.3	-15900	-17219.3	-15800
Avg. Abs. Vert. Error	204.12	735.26	917.9	945.74	990.05	1065.64	1099.49
Stddev. Abs. Vert. Error	632.66	1435.73	1737.43	1779.27	1878.23	1965.15	2044.49
Max. Abs. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Abs. Vert. Error	0	0	0	0	0	0	0
Avg. Slant Range Error	1.21	3.18	5.12	6.84	8.26	9.37	10.18
Stddev. Slant Range Error	1.09	3.39	5.46	7.27	8.88	10.09	10.89
Max. Slant Range Error	42.39	84.34	125.72	167.86	173.7	156.48	169.84
Min. Slant Range Error	0	0.01	0.02	0.03	0.02	0.01	0.04

Figure A.1- 1 Descriptive Statistics for Look Ahead Times 0 to 1800 Seconds from All Samples

Look Ahead Time (sec)	0	300	600	900	1200	1500	1800
Sample Quantity	26148	22500	18210	13972	10374	7307	4891
Avg. Horz. Error	1.14	3.18	5.22	6.99	8.45	9.65	10.62
Stddev. Horz. Error	0.94	3.54	5.7	7.65	9.32	10.63	11.55
Max. Horz. Error	42.39	84.31	125.68	167.79	173.62	156.35	169.84
Min. Horz. Error	0	0.01	0.02	0.03	0.02	0.01	0.04
Avg. Lat. Error	-0.02	-0.12	-0.23	-0.28	-0.27	-0.38	-0.44
Stddev. Lat. Error	1.2	3.8	5.82	7.58	9.18	10.25	10.75
Max. Lat. Error	32.23	65.49	97.45	129.48	134.87	120.34	117.09
Min. Lat. Error	-6.04	-39.47	-61.74	-94.55	-124.94	-143.49	-155.99
Avg. Abs. Lat. Error	0.8	2.02	3.06	3.91	4.59	4.98	5.08
Stddev. Abs. Lat. Error	0.89	3.22	4.95	6.5	7.95	8.96	9.48
Max. Abs. Lat. Error	32.23	65.49	97.45	129.48	134.87	143.49	155.99
Min. Abs. Lat. Error	0	0	0	0	0	0	0
Avg. Long. Error	-0.02	0.13	0.4	0.54	0.8	0.87	0.78
Stddev. Long. Error	0.86	2.86	5.07	7.03	8.56	10.01	11.39
Max. Long. Error	11.93	25.52	91.73	94.25	96.16	97.63	98.01
Min. Long. Error	-27.53	-65.39	-79.36	-106.71	-109.33	-99.82	-78.53
Avg. Abs. Long. Error	0.59	1.85	3.25	4.49	5.57	6.62	7.62
Stddev. Abs. Long. Error	0.63	2.19	3.91	5.44	6.54	7.55	8.51
Max. Abs. Long. Error	27.53	65.39	91.73	106.71	109.33	99.82	98.01
Min. Abs. Long. Error	0	0	0	0	0	0	0
Avg. Vert. Error	38.78	59.57	13.09	-42.69	-103.07	-169.1	-180.17
Stddev. Vert. Error	591.85	1454.4	1819.69	1852.29	1926.2	2029.34	2142.77
Max. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Vert. Error	-2800	-10304.6	-10552	-10700	-10485.7	-9483.61	-10550
Avg. Abs. Vert. Error	136.88	596.82	771.9	779.14	776.69	839.48	893.45
Stddev. Abs. Vert. Error	577.11	1327.64	1647.91	1680.98	1765.66	1855.27	1955.9
Max. Abs. Vert. Error	36817	34817	28933	30746.5	37473.73	38907.87	31668.16
Min. Abs. Vert. Error	0	0	0	0	0	0	0
Avg. Slant Range Error	1.14	3.2	5.23	7	8.46	9.66	10.63
Stddev. Slant Range Error	0.94	3.54	5.7	7.65	9.31	10.63	11.54
Max. Slant Range Error	42.39	84.34	125.72	167.86	173.7	156.48	169.84
Min. Slant Range Error	0	0.01	0.02	0.03	0.02	0.01	0.04

Figure A.1- 2 Descriptive Statistics for Look Ahead Times 0 to 1800 Seconds from Samples at Altitudes Above 18,000 Feet

A.1.1.2 Statistical Tests



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	35928	1.2048	1.0839	0.00572
600	23964	5.1080	5.4667	0.03531
1200	13836	8.2473	8.8872	0.07555
1800	6444	10.1669	10.8984	0.13576
Means Comparisons				
Dif=Mean[i]-Mean[j]		1800	1200	600
1800		0.00000	1.91965	5.05891
1200		-1.91965	0.00000	3.13926
600		-5.05891	-3.13926	0.00000
0		-8.96211	-7.04246	-3.90320
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 2.56909		
Abs(Dif)-LSD		1800	1200	600
1800		-0.25856	1.69830	4.85296
1200		1.69830	-0.17645	2.98256
600		4.85296	2.98256	-0.13408
0		8.76356	6.89562	3.78080
				-0.10950

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

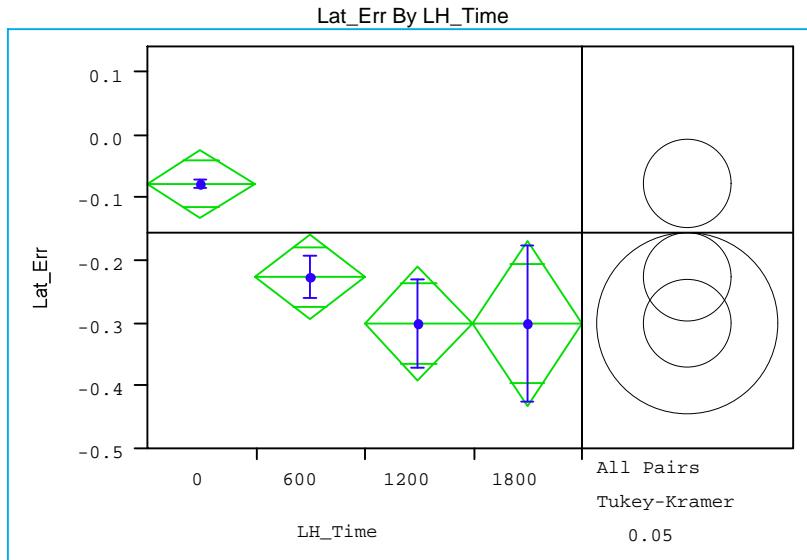
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	35928	1.08390	0.713831	0.685369
600	23964	5.46669	3.659114	3.360835
1200	13836	8.88717	5.819963	5.386845
1800	6444	10.89841	7.014038	6.490122

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	438.8907	3	80168	<.0001
Brown-Forsythe	4945.2758	3	80168	0.0000
Levene	7382.1189	3	80168	0.0000
Bartlett	33662.339	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
8172.2643	3	18809	0.0000

Figure A.1- 3 Statistical Tests for Horizontal Error and Look Ahead Time for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	35928	-0.02289	1.3424	0.00708
600	23964	-0.17089	5.4328	0.03509
1200	13836	-0.21287	8.4066	0.07147
1800	6444	-0.22177	10.0570	0.12528

Means Comparisons				
Dif=Mean[i]-Mean[j]	0	600	1200	1800
0	0.000000	0.147991	0.189972	0.198874
600	-0.14799	0.000000	0.041980	0.050883
1200	-0.18997	-0.04198	0.000000	0.008903
1800	-0.19887	-0.05088	-0.0089	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Dif=Mean[i]-Mean[j]	0	600	1200	1800
0	0.000000	0.147991	0.189972	0.198874
600	-0.14799	0.000000	0.041980	0.050883
1200	-0.18997	-0.04198	0.000000	0.008903
1800	-0.19887	-0.05088	-0.0089	0.000000

Abs(Dif)-LSD	0	600	1200	1800
0	-0.10491	0.030718	0.049287	0.008655
600	0.030718	-0.12845	-0.10815	-0.14643
1200	0.049287	-0.10815	-0.16905	-0.20316
1800	0.008655	-0.14643	-0.20316	-0.24771

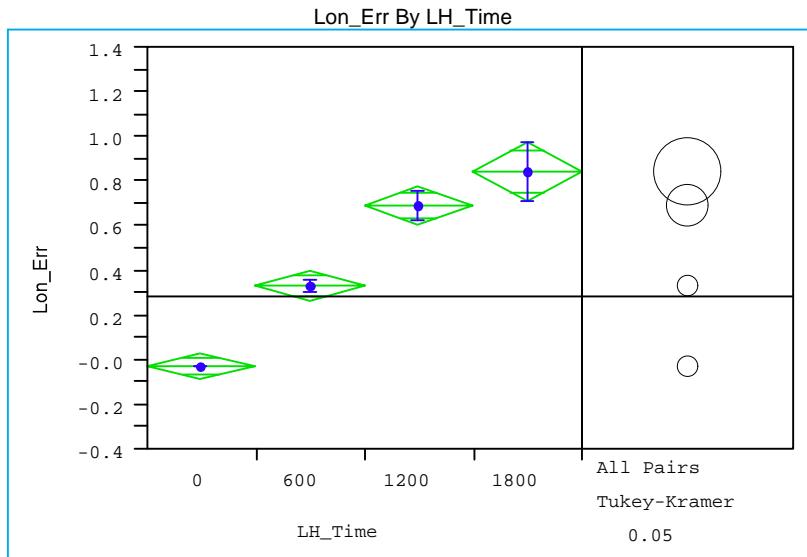
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	35928	1.34238	0.871379	0.871062
600	23964	5.43278	2.881018	2.864207
1200	13836	8.40656	4.184118	4.157163
1800	6444	10.05703	4.775601	4.743031

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien.[.5]	447.7444	3	80168	<.0001
Brown-Forsythe	2485.9252	3	80168	0.0000
Levene	2539.9707	3	80168	0.0000
Bartlett	27206.524	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	8.6634	3	18950	<.0001

Figure A.1- 4 Statistical Tests for Lateral Error and Look Ahead Time for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	35928	-0.01595	0.9075	0.00479
600	23964	0.361484	5.1286	0.03313
1200	13836	0.694580	8.7067	0.07402
1800	6444	0.875566	10.9635	0.13657

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.000000	0.180986	0.514082	0.891517
1200	-0.18099	0.000000	0.333096	0.710531
600	-0.51408	-0.3331	0.000000	0.377436
0	-0.89152	-0.71053	-0.37744	0.000000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

$q^* = 2.56909$

Abs(Dif)-LSD	1800	1200	600	0
1800	-0.25189	-0.03465	0.313445	0.698090
1200	-0.03465	-0.1719	0.180432	0.567474
600	0.313445	0.180432	-0.13062	0.258185
0	0.698090	0.567474	0.258185	-0.10668

Positive values show pairs of means that are significantly different.

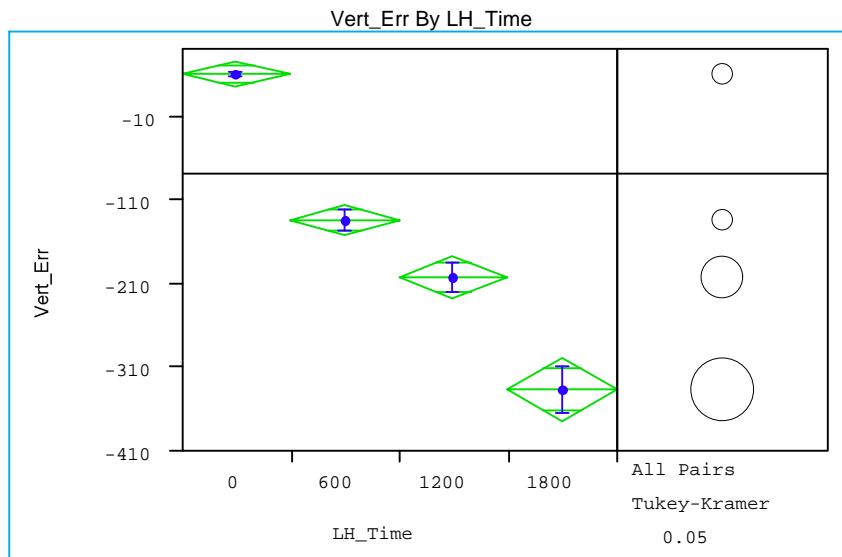
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	35928	0.90754	0.608203	0.608152
600	23964	5.12860	3.300234	3.299056
1200	13836	8.70666	5.696847	5.696779
1800	6444	10.96346	7.376215	7.376185

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1089.3936	3	80168	0.0000
Brown-Forsythe	8142.8187	3	80168	0.0000
Levene	8145.8936	3	80168	0.0000
Bartlett	37702.337	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
86.1528	3	18755	<.0001

Figure A.1- 5 Statistical Tests for Longitudinal Error and Look Ahead Time for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	35928	49.356	662.94	3.497
600	23964	-126.578	1960.92	12.667
1200	13836	-200.706	2113.70	17.970
1800	6444	-327.149	2298.25	28.630
Means Comparisons				
Dif=Mean[i]-Mean[j]	0	600	1200	1800
0	0.000	175.935	250.062	376.506
600	-175.935	0.000	74.128	200.571
1200	-250.062	-74.128	0.000	126.443
1800	-376.506	-200.571	-126.443	0.000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	q* = 2.56909			
Abs(Dif)-LSD	0	600	1200	1800
0	-30.560	141.773	209.081	321.094
600	141.773	-37.419	30.394	143.095
1200	209.081	30.394	-49.245	64.669
1800	321.094	143.095	64.669	-72.159

Positive values show pairs of means that are significantly different.

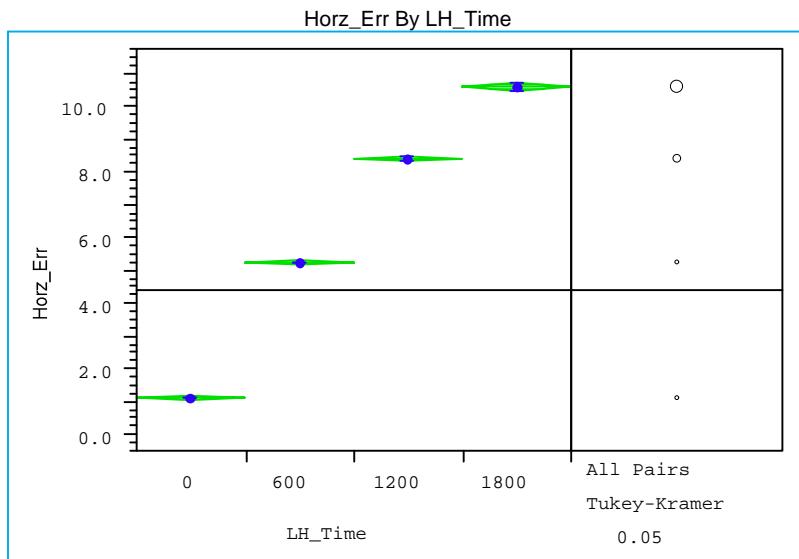
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	35928	662.937	228.883	204.125
600	23964	1960.920	980.693	917.897
1200	13836	2113.700	1091.512	990.048
1800	6444	2298.255	1262.250	1099.493

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	346.4660	3	80168	<.0001
Brown-Forsythe	1926.9792	3	80168	0.0000
Levene	2460.3926	3	80168	0.0000
Bartlett	13539.252	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
166.8785	3	19585	<.0001

Figure A.1- 6 Statistical Tests for Vertical Error and Look Ahead Time for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	26148	1.1369	0.9427	0.00583
600	18210	5.2202	5.7019	0.04225
1200	10374	8.4471	9.3181	0.09149
1800	4891	10.6181	11.5491	0.16514

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.00000	2.17100	5.39794	9.48126
1200	-2.17100	0.00000	3.22694	7.31026
600	-5.39794	-3.22694	0.00000	4.08332
0	-9.48126	-7.31026	-4.08332	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	1800	1200	600	0
1800	-0.31329	1.90228	5.14843	9.23990
1200	1.90228	-0.21512	3.03637	7.13049
600	5.14843	3.03637	-0.16236	3.93378
0	9.23990	7.13049	3.93378	-0.13550

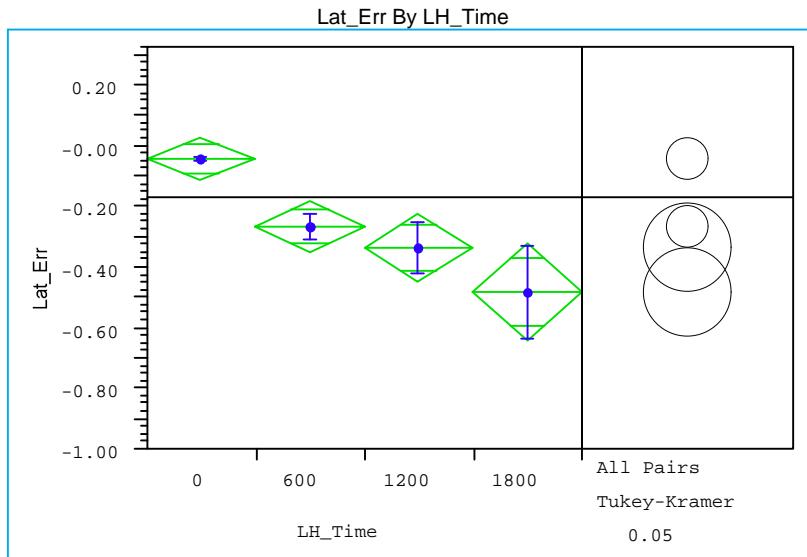
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
0	26148	0.94270	0.651186	0.630549
600	18210	5.70192	3.823976	3.488516
1200	10374	9.31807	6.029985	5.557946
1800	4891	11.54910	7.371841	6.820868

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	320.4503	3	59619	<.0001
Brown-Forsythe	3634.9075	3	59619	0.0000
Levene	5489.3036	3	59619	0.0000
Bartlett	27901.034	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	6203.3622	3	14182	0.0000

Figure A.1- 7 Statistical Tests for Horizontal Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	26148	-0.02491	1.1993	0.00742
600	18210	-0.23282	5.8169	0.04311
1200	10374	-0.26522	9.1795	0.09012
1800	4891	-0.44387	10.7500	0.15371

Means Comparisons				
Dif=Mean[i]-Mean[j]	0	600	1200	1800
0	0.000000	0.207907	0.240304	0.418956
600	-0.20791	0.000000	0.032397	0.211049
1200	-0.2403	-0.0324	0.000000	0.178652
1800	-0.41896	-0.21105	-0.17865	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	0	600	1200	1800
0	-0.13312	0.060990	0.063682	0.181820
600	0.060990	-0.15952	-0.15484	-0.0341
1200	0.063682	-0.15484	-0.21135	-0.08537
1800	0.181820	-0.0341	-0.08537	-0.30781

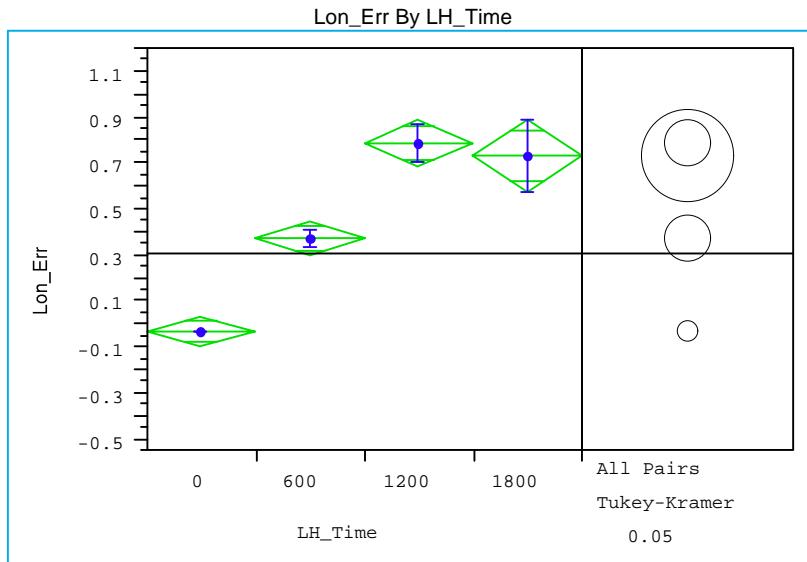
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
0	26148	1.19928	0.803931	0.803539
600	18210	5.81685	3.088452	3.058630
1200	10374	9.17947	4.634173	4.594108
1800	4891	10.75002	5.179103	5.080457

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	356.9652	3	59619	<.0001
Brown-Forsythe	2021.3661	3	59619	0.0000
Levene	2102.8972	3	59619	0.0000
Bartlett	23098.169	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	12.1520	3	14260	<.0001

Figure A.1- 8 Statistical Tests for Lateral Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	26148	-0.02453	0.8612	0.00533
600	18210	0.399772	5.0709	0.03758
1200	10374	0.798268	8.5567	0.08401
1800	4891	0.776635	11.3924	0.16290

Means Comparisons				
Dif=Mean[i]-Mean[j]	1200	1800	600	0
1200	0.000000	0.021634	0.398496	0.822802
1800	-0.02163	0.000000	0.376863	0.801168
600	-0.3985	-0.37686	0.000000	0.424306
0	-0.8228	-0.80117	-0.42431	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
$q^* = 2.56910$				
Abs(Dif)-LSD	1200	1800	600	0
1200	-0.20041	-0.22872	0.220953	0.655324
1800	-0.22872	-0.29187	0.144411	0.576311
600	0.220953	0.144411	-0.15126	0.284995
0	0.655324	0.576311	0.284995	-0.12623

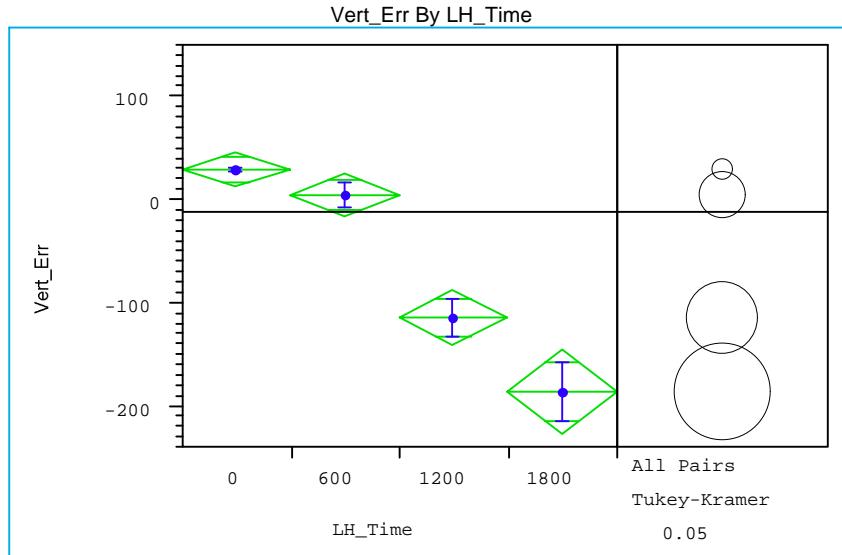
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	26148	0.86125	0.591115	0.591057
600	18210	5.07091	3.245947	3.242524
1200	10374	8.55670	5.551472	5.547547
1800	4891	11.39239	7.592835	7.592169

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	753.7629	3	59619	0.0000
Brown-Forsythe	5913.6135	3	59619	0.0000
Levene	5930.1703	3	59619	0.0000
Bartlett	28718.836	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	80.6834	3	14183	<.0001

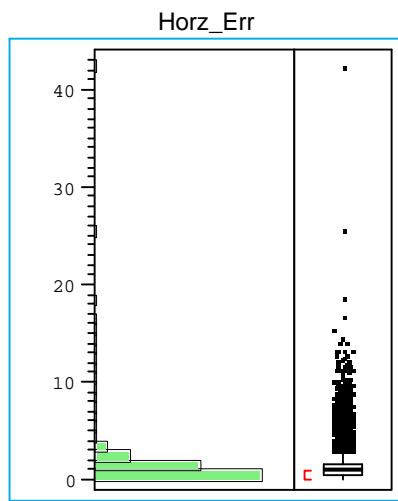
Figure A.1- 9 Statistical Tests for Longitudinal Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	26148	38.780	591.85	3.660
600	18210	13.094	1819.69	13.485
1200	10374	-103.070	1926.20	18.912
1800	4891	-180.173	2142.77	30.639
Means Comparisons				
Dif=Mean[i]-Mean[j]	0	600	1200	1800
0	0.000	25.686	141.850	218.952
600	-25.686	0.000	116.164	193.266
1200	-141.850	-116.164	0.000	77.103
1800	-218.952	-193.266	-77.103	0.000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 2.56910		
Abs(Dif)-LSD	0	0	600	1200
	0	-33.229	-10.986	97.764
	600	-10.986	-39.818	69.428
	1200	97.764	69.428	-52.754
	1800	159.762	132.077	11.202
				-76.830
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	26148	591.852	160.7907	136.8790
600	18210	1819.695	780.0067	771.9043
1200	10374	1926.200	835.6573	776.6929
1800	4891	2142.772	998.2717	893.4473
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	160.9942	3	59619	<.0001
Brown-Forsythe	1154.5767	3	59619	0.0000
Levene	1257.8525	3	59619	0.0000
Bartlett	10409.214	3	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	34.6228	3	14798	<.0001

Figure A.1- 10 Statistical Tests for Vertical Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet

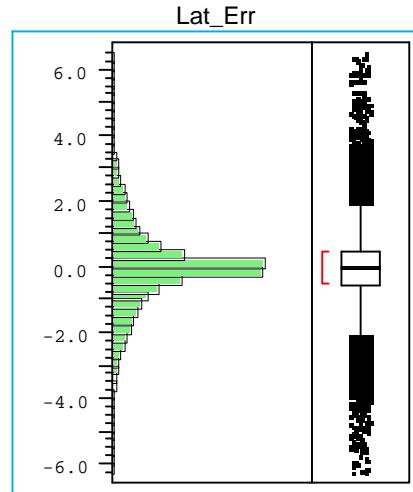
A.1.1.3 Histograms



Quantiles		
maximum	100.0%	42.390
	99.5%	6.717
	97.5%	3.499
	90.0%	2.374
quartile	75.0%	1.585
median	50.0%	0.961
quartile	25.0%	0.528
	10.0%	0.258
	2.5%	0.101
	0.5%	0.032
minimum	0.0%	0.000

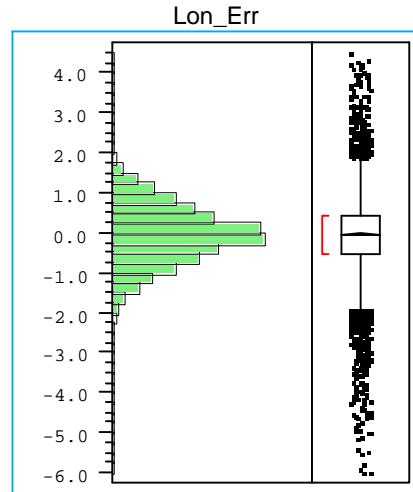
Moments	
Mean	1.20
Std Dev	1.08
Std Error Mean	0.01
Upper 95% Mean	1.22
Lower 95% Mean	1.19
N	35928.00
Sum Weights	35928.00

Figure A.1- 11 Histogram and Quantiles for Horizontal Error and Look Ahead Time 0 for Samples at All Altitudes



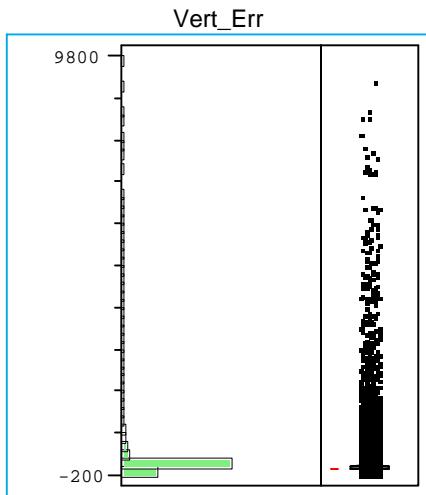
	Quantiles	
maximum	100.0%	32.233
	99.5%	3.838
	97.5%	2.725
	90.0%	1.493
quartile	75.0%	0.483
median	50.0%	-0.003
quartile	25.0%	-0.531
	10.0%	-1.571
	2.5%	-2.761
	0.5%	-3.915
minimum	0.0%	-15.999
	Moments	
Mean		-0.02
Std Dev		1.34
Std Error Mean		0.01
Upper 95% Mean		-0.01
Lower 95% Mean		-0.04
N		35928.00
Sum Weights		35928.00

Figure A.1- 12 Histogram and Quantiles for Lateral Error and Look Ahead Time 0 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	11.926
	99.5%	2.393
	97.5%	1.461
	90.0%	0.948
quartile	75.0%	0.466
median	50.0%	-0.008
quartile	25.0%	-0.488
	10.0%	-0.970
	2.5%	-1.520
	0.5%	-2.549
minimum	0.0%	-27.532
 Moments		
Mean		-0.02
Std Dev		0.91
Std Error Mean		0.00
Upper 95% Mean		-0.01
Lower 95% Mean		-0.03
N		35928.00
Sum Weights		35928.00

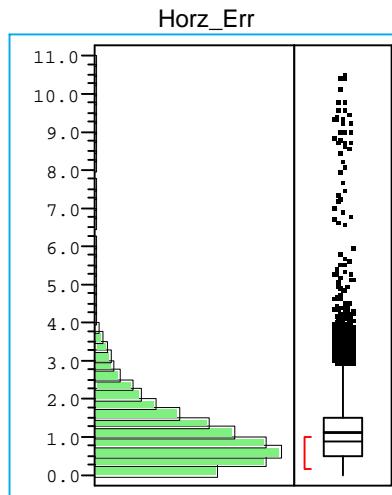
Figure A.1- 13 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 0 for Samples at All Altitudes



Quantiles		
maximum	100.0%	36817
	99.5%	2831
	97.5%	1077
	90.0%	344
quartile	75.0%	24
median	50.0%	0
quartile	25.0%	0
	10.0%	-200
	2.5%	-832
	0.5%	-1513
minimum	0.0%	-6824

Moments		
Mean		49.36
Std Dev		662.94
Std Error Mean		3.50
Upper 95% Mean		56.21
Lower 95% Mean		42.50
N		35928.00
Sum Weights		35928.00

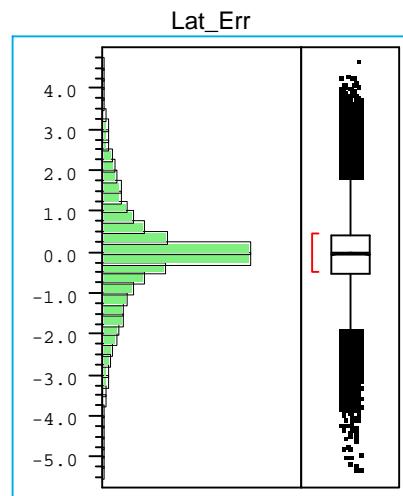
Figure A.1- 14 Histogram and Quantiles for Vertical Error and Look Ahead Time 0 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	42.390
	99.5%	4.092
	97.5%	3.242
	90.0%	2.266
quartile	75.0%	1.528
median	50.0%	0.938
quartile	25.0%	0.516
	10.0%	0.251
	2.5%	0.097
	0.5%	0.031
minimum	0.0%	0.000

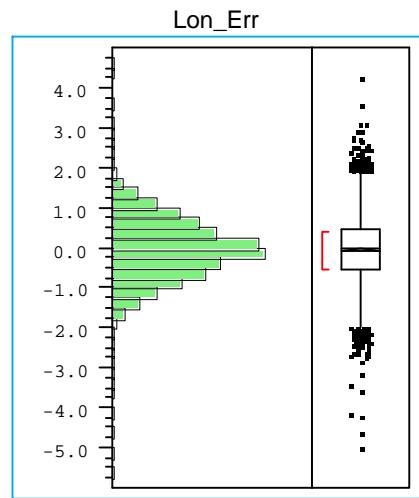
	Moments
Mean	1.14
Std Dev	0.94
Std Error Mean	0.01
Upper 95% Mean	1.15
Lower 95% Mean	1.13
N	26148.00
Sum Weights	26148.00

Figure A.1- 15 Histogram and Quantiles for Horizontal Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



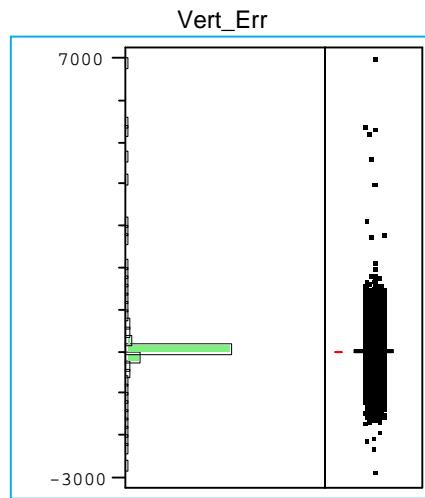
	Quantiles	
maximum	100.0%	32.233
	99.5%	3.470
	97.5%	2.578
	90.0%	1.403
quartile	75.0%	0.432
median	50.0%	-0.004
quartile	25.0%	-0.491
	10.0%	-1.515
	2.5%	-2.646
	0.5%	-3.547
minimum	0.0%	-6.035
 Moments		
Mean		-0.02
Std Dev		1.20
Std Error Mean		0.01
Upper 95% Mean		-0.01
Lower 95% Mean		-0.04
N		26148.00
Sum Weights		26148.00

Figure A.1- 16 Histogram and Quantiles for Lateral Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	11.926
	99.5%	1.824
	97.5%	1.401
	90.0%	0.931
quartile	75.0%	0.468
median	50.0%	-0.016
quartile	25.0%	-0.510
	10.0%	-0.966
	2.5%	-1.451
	0.5%	-1.938
minimum	0.0%	-27.532
Moments		
Mean		-0.02
Std Dev		0.86
Std Error Mean		0.01
Upper 95% Mean		-0.01
Lower 95% Mean		-0.03
N		26148.00
Sum Weights		26148.00

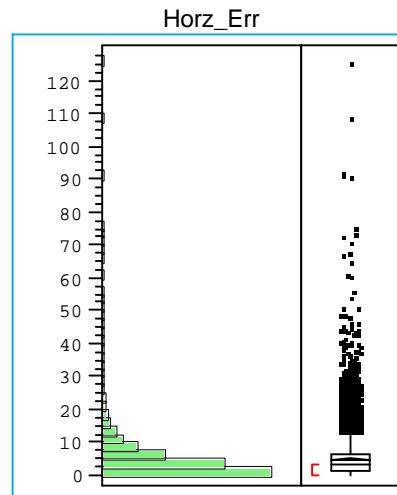
Figure A.1- 17 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	36817
	99.5%	1315
	97.5%	889
	90.0%	200
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	0
	10.0%	-100
	2.5%	-607
	0.5%	-1101
minimum	0.0%	-2800

Moments		
Mean		38.78
Std Dev		591.85
Std Error Mean		3.66
Upper 95% Mean		45.95
Lower 95% Mean		31.61
N		26148.00
Sum Weights		26148.00

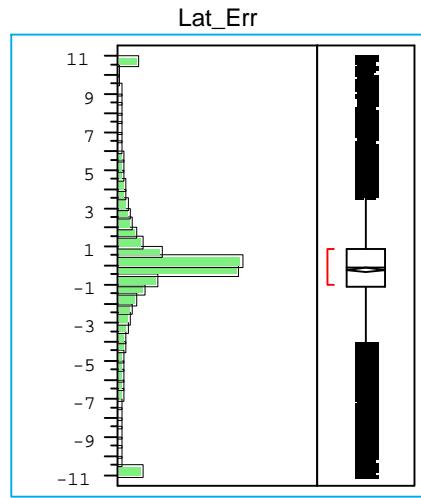
Figure A.1- 18 Histogram and Quantiles for Vertical Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



	Quantiles	
maximum	100.0%	125.68
	99.5%	29.29
	97.5%	19.31
	90.0%	11.40
quartile	75.0%	6.61
median	50.0%	3.41
quartile	25.0%	1.73
	10.0%	0.84
	2.5%	0.34
	0.5%	0.14
minimum	0.0%	0.02

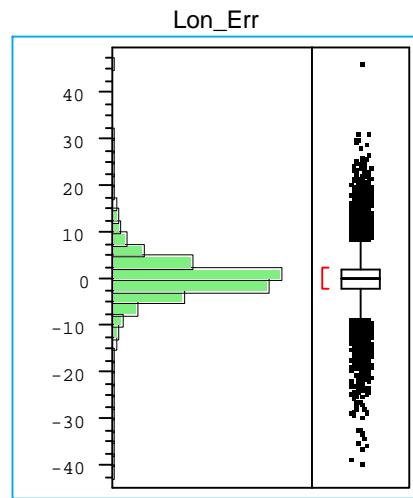
	Moments
Mean	5.11
Std Dev	5.47
Std Error Mean	0.04
Upper 95% Mean	5.18
Lower 95% Mean	5.04
N	23964.00
Sum Weights	23964.00

Figure A.1- 19 Histogram and Quantiles for Horizontal Error and Look Ahead Time 600 for Samples at All Altitudes



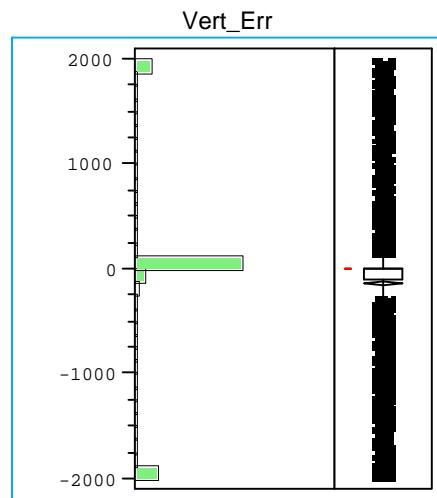
Quantiles		
maximum	100.0%	97.448
	99.5%	20.990
	97.5%	11.379
	90.0%	4.208
quartile	75.0%	0.891
median	50.0%	-0.002
quartile	25.0%	-1.028
	10.0%	-5.083
	2.5%	-12.677
	0.5%	-21.637
minimum	0.0%	-61.740
Moments		
Mean		-0.17
Std Dev		5.43
Std Error Mean		0.04
Upper 95% Mean		-0.10
Lower 95% Mean		-0.24
N		23964.00
Sum Weights		23964.00

Figure A.1- 20 Histogram and Quantiles for Lateral Error and Look Ahead Time 600 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	91.729
	99.5%	18.430
	97.5%	11.242
	90.0%	5.349
quartile	75.0%	2.459
median	50.0%	0.264
quartile	25.0%	-1.891
	10.0%	-4.385
	2.5%	-9.435
	0.5%	-17.924
minimum	0.0%	-79.363
	Moments	
Mean		0.36
Std Dev		5.13
Std Error Mean		0.03
Upper 95% Mean		0.43
Lower 95% Mean		0.30
N		23964.00
Sum Weights		23964.00

Figure A.1- 21 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 600 for Samples at All Altitudes



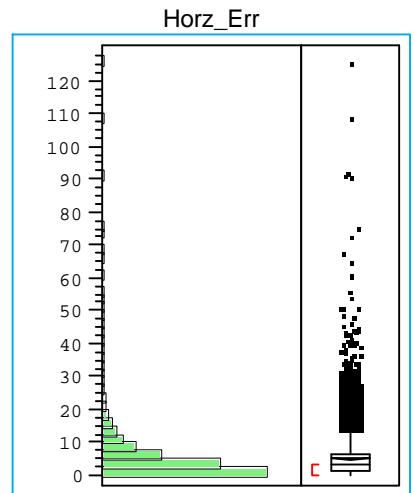
Quantiles

	maximum	100.0%	28933
		99.5%	8000
		97.5%	4300
		90.0%	1273
quartile		75.0%	0
median		50.0%	0
quartile		25.0%	-100
		10.0%	-2000
		2.5%	-4549
		0.5%	-7304
minimum		0.0%	-15374

Moments

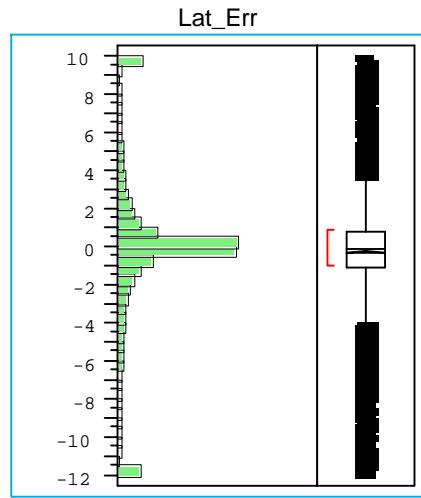
	Mean	-126.58
	Std Dev	1960.92
	Std Error Mean	12.67
	Upper 95% Mean	-101.75
	Lower 95% Mean	-151.41
N		23964.00
Sum Weights		23964.00

Figure A.1- 22 Histogram and Quantiles for Vertical Error and Look Ahead Time 600 for Samples at All Altitudes



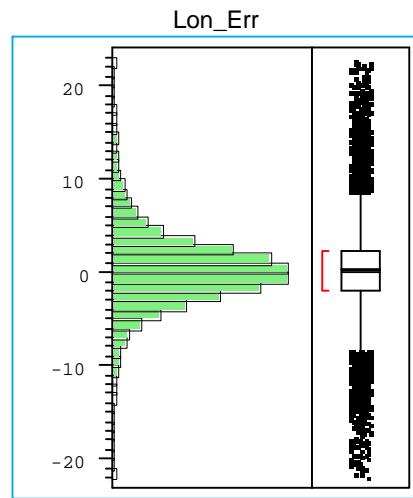
	Quantiles	
maximum	100.0%	125.68
	99.5%	30.02
	97.5%	20.02
	90.0%	11.96
quartile	75.0%	6.74
median	50.0%	3.39
quartile	25.0%	1.71
	10.0%	0.84
	2.5%	0.33
	0.5%	0.13
minimum	0.0%	0.02
 Moments		
Mean		5.22
Std Dev		5.70
Std Error Mean		0.04
Upper 95% Mean		5.30
Lower 95% Mean		5.14
N		18210.00
Sum Weights		18210.00

Figure A.1- 23 Histogram and Quantiles for Horizontal Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



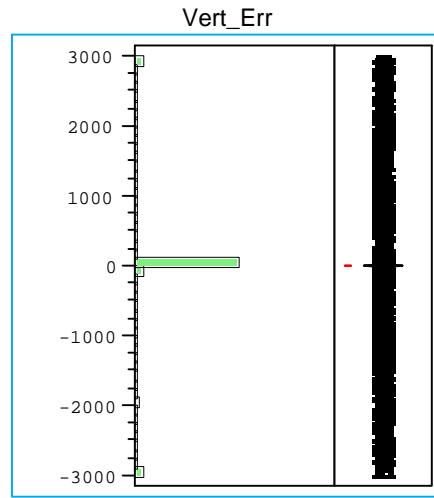
Quantiles		
maximum	100.0%	97.448
	99.5%	21.986
	97.5%	12.112
	90.0%	4.455
quartile	75.0%	0.863
median	50.0%	-0.010
quartile	25.0%	-1.064
	10.0%	-5.616
	2.5%	-13.873
	0.5%	-22.433
minimum	0.0%	-61.740
Moments		
Mean		-0.23
Std Dev		5.82
Std Error Mean		0.04
Upper 95% Mean		-0.15
Lower 95% Mean		-0.32
N		18210.00
Sum Weights		18210.00

Figure A.1- 24 Histogram and Quantiles for Lateral Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	91.729
	99.5%	18.705
	97.5%	11.698
	90.0%	5.270
quartile	75.0%	2.406
median	50.0%	0.233
quartile	25.0%	-1.847
	10.0%	-4.153
	2.5%	-9.090
	0.5%	-17.506
minimum	0.0%	-79.363
Moments		
Mean		0.40
Std Dev		5.07
Std Error Mean		0.04
Upper 95% Mean		0.47
Lower 95% Mean		0.33
N		18210.00
Sum Weights		18210.00

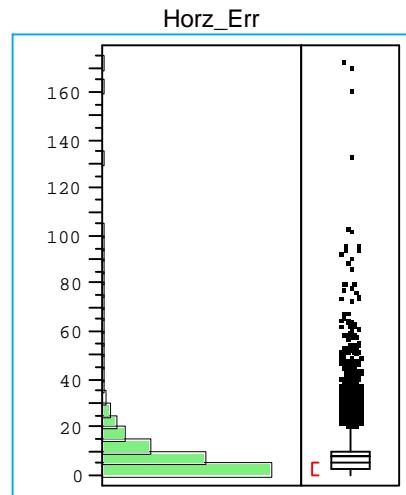
Figure A.1- 25 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



	Quantiles	
maximum	100.0%	28933
	99.5%	8533
	97.5%	4420
	90.0%	1144
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	0
	10.0%	-1563
	2.5%	-4000
	0.5%	-6032
minimum	0.0%	-10552

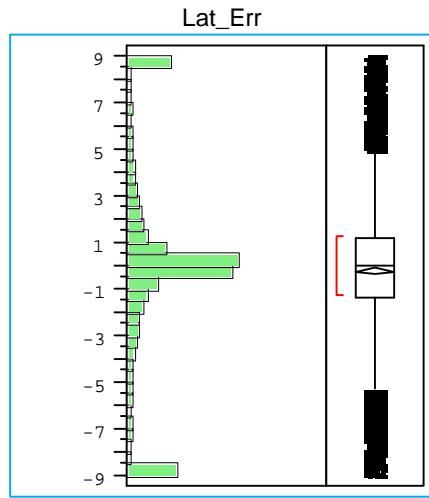
	Moments
Mean	13.09
Std Dev	1819.69
Std Error Mean	13.48
Upper 95% Mean	39.53
Lower 95% Mean	-13.34
N	18210.00
Sum Weights	18210.00

Figure A.1- 26 Histogram and Quantiles for Vertical Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



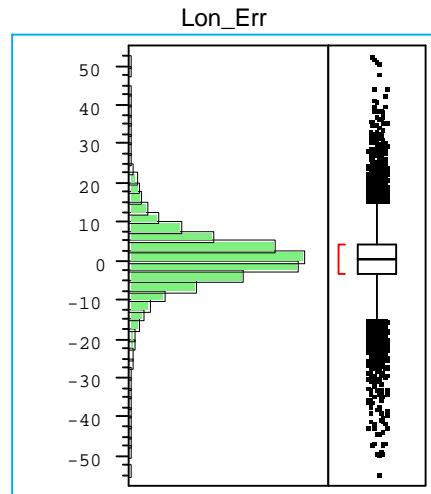
	Quantiles	
maximum	100.0%	173.62
	99.5%	51.34
	97.5%	30.25
	90.0%	18.15
quartile	75.0%	10.56
median	50.0%	5.64
quartile	25.0%	2.85
	10.0%	1.34
	2.5%	0.52
	0.5%	0.22
minimum	0.0%	0.02
Moments		
Mean		8.25
Std Dev		8.89
Std Error Mean		0.08
Upper 95% Mean		8.40
Lower 95% Mean		8.10
N		13836.00
Sum Weights		13836.00

Figure A.1- 27 Histogram and Quantiles for Horizontal Error and Look Ahead Time 1200 for Samples at All Altitudes



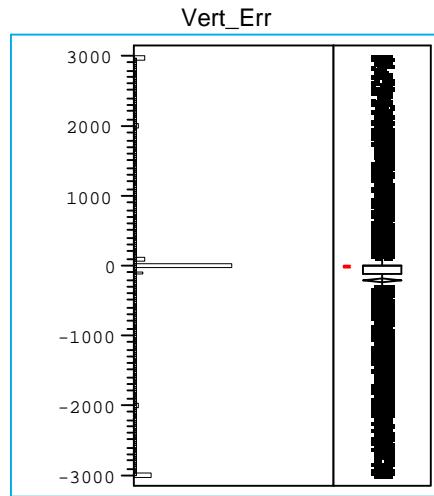
Quantiles		
maximum	100.0%	134.87
	99.5%	30.74
	97.5%	16.67
	90.0%	6.21
quartile	75.0%	1.21
median	50.0%	0.01
quartile	25.0%	-1.36
	10.0%	-7.04
	2.5%	-18.78
	0.5%	-36.18
minimum	0.0%	-124.94
Moments		
Mean		-0.21
Std Dev		8.41
Std Error Mean		0.07
Upper 95% Mean		-0.07
Lower 95% Mean		-0.35
N		13836.00
Sum Weights		13836.00

Figure A.1- 28 Histogram and Quantiles for Lateral Error and Look Ahead Time 1200 for Samples at All Altitudes



Quantiles		
maximum	100.0%	96.16
	99.5%	29.86
	97.5%	18.53
	90.0%	9.34
quartile	75.0%	4.50
median	50.0%	0.66
quartile	25.0%	-3.13
	10.0%	-7.55
	2.5%	-16.60
	0.5%	-30.62
minimum	0.0%	-109.33
Moments		
Mean		0.69
Std Dev		8.71
Std Error Mean		0.07
Upper 95% Mean		0.84
Lower 95% Mean		0.55
N		13836.00
Sum Weights		13836.00

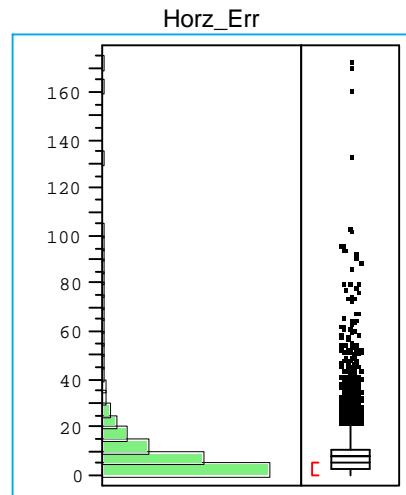
Figure A.1- 29 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 1200 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	37474
	99.5%	7774
	97.5%	4033
	90.0%	1235
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-100
	10.0%	-2459
	2.5%	-4933
	0.5%	-7560
minimum	0.0%	-15900

	Moments
Mean	-200.71
Std Dev	2113.70
Std Error Mean	17.97
Upper 95% Mean	-165.48
Lower 95% Mean	-235.93
N	13836.00
Sum Weights	13836.00

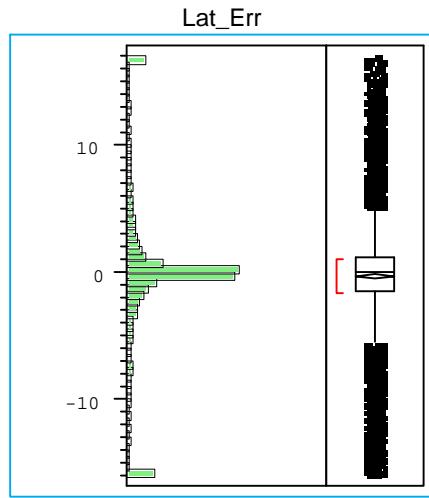
Figure A.1- 30 Histogram and Quantiles for Vertical Error and Look Ahead Time 1200 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	173.62
	99.5%	53.61
	97.5%	31.39
	90.0%	18.72
quartile	75.0%	10.80
median	50.0%	5.69
quartile	25.0%	2.90
	10.0%	1.35
	2.5%	0.50
	0.5%	0.21
minimum	0.0%	0.02

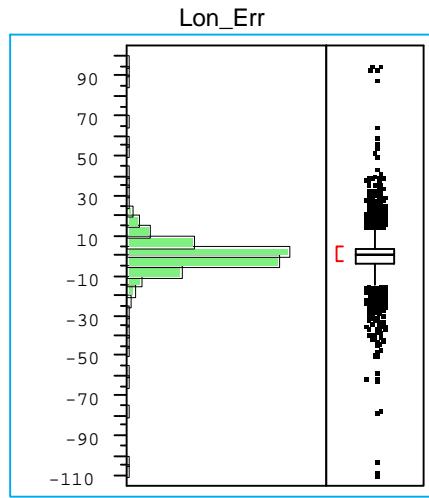
	Moments
Mean	8.45
Std Dev	9.32
Std Error Mean	0.09
Upper 95% Mean	8.63
Lower 95% Mean	8.27
N	10374.00
Sum Weights	10374.00

Figure A.1- 31 Histogram and Quantiles for Horizontal Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



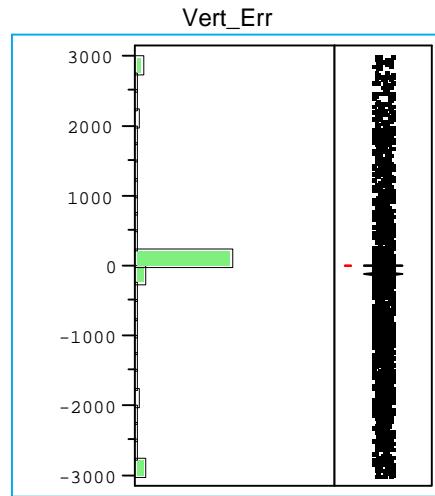
	Quantiles	
maximum	100.0%	134.87
	99.5%	33.48
	97.5%	18.17
	90.0%	7.16
quartile	75.0%	1.25
median	50.0%	0.01
quartile	25.0%	-1.44
	10.0%	-8.13
	2.5%	-20.01
	0.5%	-39.32
minimum	0.0%	-124.94
	Moments	
Mean		-0.27
Std Dev		9.18
Std Error Mean		0.09
Upper 95% Mean		-0.09
Lower 95% Mean		-0.44
N		10374.00
Sum Weights		10374.00

Figure A.1- 32 Histogram and Quantiles for Lateral Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	96.16
	99.5%	30.18
	97.5%	18.87
	90.0%	9.22
quartile	75.0%	4.39
median	50.0%	0.57
quartile	25.0%	-3.14
	10.0%	-7.08
	2.5%	-15.20
	0.5%	-29.10
minimum	0.0%	-109.33
Moments		
Mean		0.80
Std Dev		8.56
Std Error Mean		0.08
Upper 95% Mean		0.96
Lower 95% Mean		0.63
N		10374.00
Sum Weights		10374.00

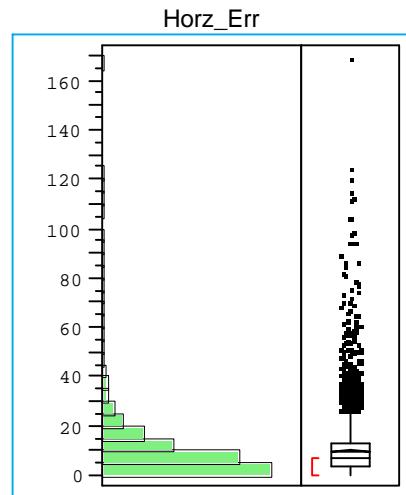
Figure A.1- 33 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



	Quantiles	
maximum	100.0%	37474
	99.5%	8000
	97.5%	4000
	90.0%	551
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	0
	10.0%	-2000
	2.5%	-4000
	0.5%	-6815
minimum	0.0%	-10486

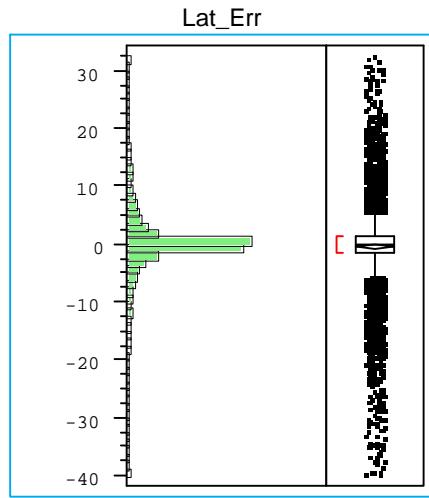
	Moments
Mean	-103.07
Std Dev	1926.20
Std Error Mean	18.91
Upper 95% Mean	-66.00
Lower 95% Mean	-140.14
N	10374.00
Sum Weights	10374.00

Figure A.1- 34 Histogram and Quantiles for Vertical Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



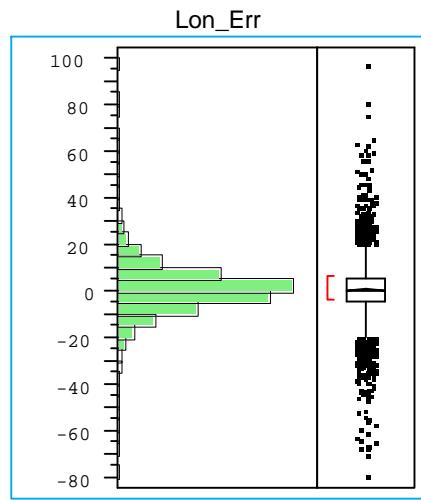
	Quantiles	
maximum	100.0%	169.84
	99.5%	66.98
	97.5%	38.45
	90.0%	21.14
quartile	75.0%	13.00
median	50.0%	7.08
quartile	25.0%	3.64
	10.0%	1.78
	2.5%	0.72
	0.5%	0.33
minimum	0.0%	0.04
 Moments		
Mean		10.167
Std Dev		10.898
Std Error Mean		0.136
Upper 95% Mean		10.433
Lower 95% Mean		9.901
N		6444.000
Sum Weights		6444.000

Figure A.1- 35 Histogram and Quantiles for Horizontal Error and Look Ahead Time 1800 for Samples at All Altitudes



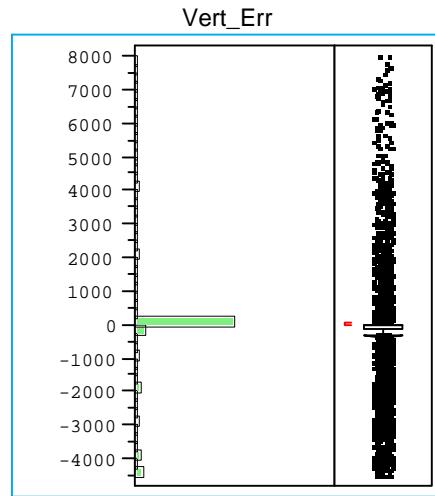
	Quantiles	
maximum	100.0%	117.09
	99.5%	36.81
	97.5%	17.96
	90.0%	7.08
quartile	75.0%	1.52
median	50.0%	0.03
quartile	25.0%	-1.31
	10.0%	-7.32
	2.5%	-20.59
	0.5%	-45.73
minimum	0.0%	-155.99
	Moments	
Mean		-0.222
Std Dev		10.057
Std Error Mean		0.125
Upper 95% Mean		0.024
Lower 95% Mean		-0.467
N		6444.000
Sum Weights		6444.000

Figure A.1- 36 Histogram and Quantiles for Lateral Error and Look Ahead Time 1800 for Samples at All Altitudes



Quantiles		
maximum	100.0%	98.009
	99.5%	41.024
	97.5%	23.072
	90.0%	12.060
quartile	75.0%	5.899
median	50.0%	0.904
quartile	25.0%	-4.277
	10.0%	-10.251
	2.5%	-20.647
	0.5%	-39.811
minimum	0.0%	-78.525
Moments		
Mean		0.876
Std Dev		10.963
Std Error Mean		0.137
Upper 95% Mean		1.143
Lower 95% Mean		0.608
N		6444.000
Sum Weights		6444.000

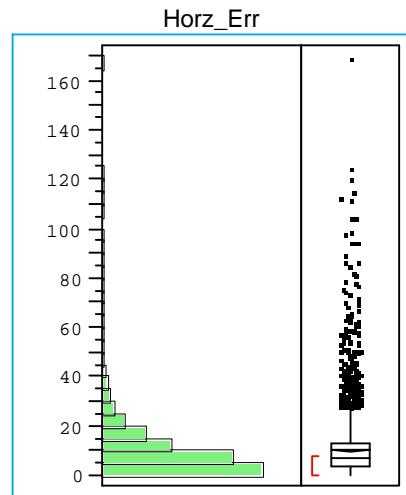
Figure A.1- 37 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 1800 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	31668
	99.5%	7732
	97.5%	4000
	90.0%	1100
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-100
	10.0%	-3100
	2.5%	-5699
	0.5%	-8000
minimum	0.0%	-15800

	Moments
Mean	-327.149
Std Dev	2298.255
Std Error Mean	28.630
Upper 95% Mean	-271.024
Lower 95% Mean	-383.275
N	6444.000
Sum Weights	6444.000

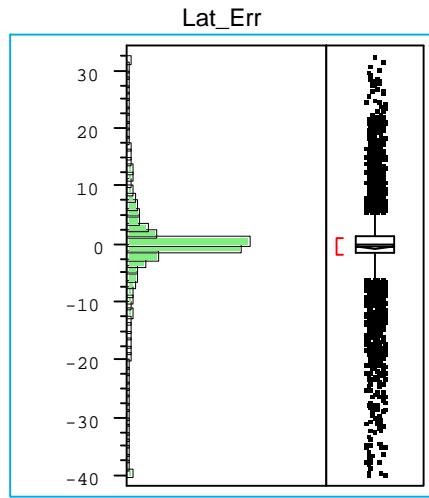
Figure A.1- 38 Histogram and Quantiles for Vertical Error and Look Ahead Time 1800 for Samples at All Altitudes



	Quantiles	
maximum	100.0%	169.84
	99.5%	74.93
	97.5%	39.65
	90.0%	21.87
quartile	75.0%	13.58
median	50.0%	7.32
quartile	25.0%	3.75
	10.0%	1.87
	2.5%	0.74
	0.5%	0.35
minimum	0.0%	0.04

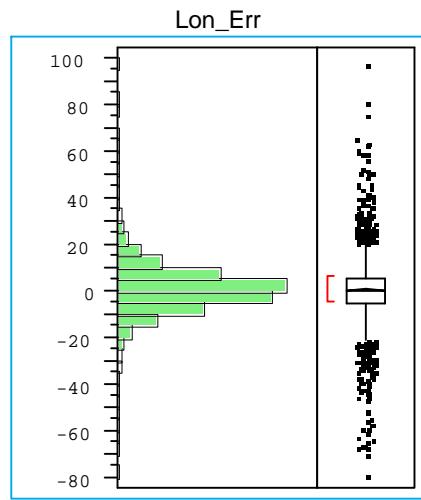
	Moments
Mean	10.618
Std Dev	11.549
Std Error Mean	0.165
Upper 95% Mean	10.942
Lower 95% Mean	10.294
N	4891.000
Sum Weights	4891.000

Figure A.1- 39 Histogram and Quantiles for Horizontal Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



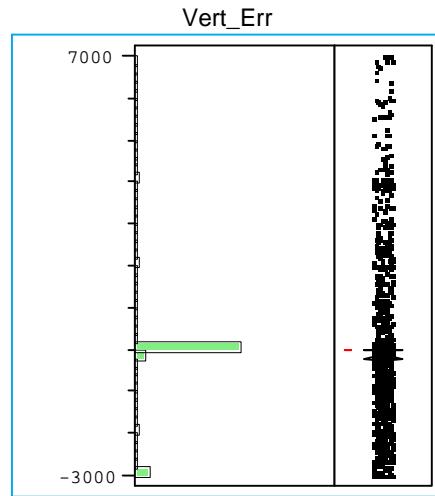
	Quantiles	
maximum	100.0%	117.09
	99.5%	35.76
	97.5%	18.17
	90.0%	7.52
quartile	75.0%	1.51
median	50.0%	0.02
quartile	25.0%	-1.44
	10.0%	-8.47
	2.5%	-23.14
	0.5%	-51.61
minimum	0.0%	-155.99
	Moments	
Mean		-0.444
Std Dev		10.750
Std Error Mean		0.154
Upper 95% Mean		-0.143
Lower 95% Mean		-0.745
N		4891.000
Sum Weights		4891.000

Figure A.1- 40 Histogram and Quantiles for Lateral Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	98.009
	99.5%	43.388
	97.5%	24.060
	90.0%	12.093
quartile	75.0%	5.896
median	50.0%	0.674
quartile	25.0%	-4.559
	10.0%	-10.386
	2.5%	-21.096
	0.5%	-42.616
minimum	0.0%	-78.525
Moments		
Mean		0.777
Std Dev		11.392
Std Error Mean		0.163
Upper 95% Mean		1.096
Lower 95% Mean		0.457
N		4891.000
Sum Weights		4891.000

Figure A.1- 41 Histogram and Quantiles for Longitudinal Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



	Quantiles	
maximum	100.0%	31668
	99.5%	7405
	97.5%	4000
	90.0%	493
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	0
	10.0%	-2450
	2.5%	-4757
	0.5%	-7115
minimum	0.0%	-10550
 Moments		
Mean		-180.173
Std Dev		2142.772
Std Error Mean		30.639
Upper 95% Mean		-120.105
Lower 95% Mean		-240.240
N		4891.000
Sum Weights		4891.000

Figure A.1- 42 Histogram and Quantiles for Vertical Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.1.2 Flight Type Per Look Ahead Time

A.1.2.1 Summary Tables

Flight type	LOOKAHEAD TIME				0 Seconds
	OVR	ARR	DEP	INR	
Sample Quantity	19015	8448	7726	739	
Avg. Horz. Error	1.15	1.31	1.22	1.39	
Stddev. Horz. Error	0.96	1.4	0.91	1.4	
Max. Horz. Error	42.39	16.91	11.93	12.94	
Min. Horz. Error	0	0	0	0	
Avg. Lat. Error	-0.04	0.03	-0.07	0.17	
Stddev. Lat. Error	1.22	1.61	1.25	1.76	
Max. Lat. Error	32.23	13.48	5.21	11.15	
Min. Lat. Error	-6.04	-16	-5.18	-12.62	
Avg. Abs. Lat. Error	0.81	0.94	0.92	1.13	
Stddev. Abs. Lat. Error	0.91	1.31	0.85	1.37	
Max. Abs. Lat. Error	32.23	16	5.21	12.62	
Min. Abs. Lat. Error	0	0	0	0	
Avg. Long. Error	-0.03	-0.06	0.06	0	
Stddev. Long. Error	0.87	1.03	0.86	0.87	
Max. Long. Error	9.46	9.33	11.93	4.1	
Min. Long. Error	-27.53	-9.81	-11.19	-4.93	
Avg. Abs. Long. Error	0.59	0.67	0.58	0.58	
Stddev. Abs. Long. Error	0.63	0.78	0.64	0.65	
Max. Abs. Long. Error	27.53	9.81	11.93	4.93	
Min. Abs. Long. Error	0	0	0	0	
Avg. Vert. Error	32.35	70.19	61.55	121.23	
Stddev. Vert. Error	499.73	925.09	660.83	758.4	
Max. Vert. Error	26434.39	36817	28933	5907.7	
Min. Vert. Error	-2264.79	-6824.15	-3113.24	-4200	
Avg. Abs. Vert. Error	100.61	373.89	261.37	328.34	
Stddev. Abs. Vert. Error	490.57	849.06	610.05	694.21	
Max. Abs. Vert. Error	26434.39	36817	28933	5907.7	
Min. Abs. Vert. Error	0	0	0	0	
Avg. Slant Range Error	1.15	1.31	1.22	1.4	
Stddev. Slant Range Error	0.96	1.4	0.91	1.4	
Max. Slant Range Error	42.39	16.91	11.93	12.96	
Min. Slant Range Error	0	0	0	0	

Figure A.1- 43 Descriptive Statistics for Flight Types at Look Ahead Time of 0 and Samples at All Altitudes

LOOKAHEAD TIME 300 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	16297	6921	6011	570
Avg. Horz. Error	2.78	3.54	3.79	3.01
Stddev. Horz. Error	3.11	3.9	3.46	2.66
Max. Horz. Error	84.31	65.56	29.61	18.52
Min. Horz. Error	0.01	0.02	0.02	0.03
Avg. Lat. Error	-0.09	-0.06	-0.19	0.35
Stddev. Lat. Error	3.51	3.89	3.75	3.02
Max. Lat. Error	65.49	27.77	26.17	16.91
Min. Lat. Error	-36.73	-39.47	-23.37	-13.13
Avg. Abs. Lat. Error	1.87	2.1	2.14	1.89
Stddev. Abs. Lat. Error	2.97	3.27	3.09	2.38
Max. Abs. Lat. Error	65.49	39.47	26.17	16.91
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.02	-0.33	0.85	0.11
Stddev. Long. Error	2.24	3.53	3.38	2.63
Max. Long. Error	25.52	23.81	20.1	16.26
Min. Long. Error	-53.1	-65.39	-18.17	-12.89
Avg. Abs. Long. Error	1.51	2.25	2.48	1.83
Stddev. Abs. Long. Error	1.66	2.74	2.45	1.9
Max. Abs. Long. Error	53.1	65.39	20.1	16.26
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-64	-236.17	383.99	284.81
Stddev. Vert. Error	958.43	2204.25	2063.02	1864.12
Max. Vert. Error	14714.2	34817	14101	9842.23
Min. Vert. Error	-9667	-12626.9	-11900	-8383
Avg. Abs. Vert. Error	321.19	1349.62	1123.14	1023.72
Stddev. Abs. Vert. Error	905.27	1758.62	1772.53	1583.15
Max. Abs. Vert. Error	14714.2	34817	14101	9842.23
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	2.79	3.57	3.81	3.03
Stddev. Slant Range Error	3.1	3.89	3.45	2.66
Max. Slant Range Error	84.34	65.56	29.61	18.52
Min. Slant Range Error	0.01	0.04	0.06	0.07

Figure A.1- 44 Descriptive Statistics for Flight Types at Look Ahead Time of 300 and Samples at All Altitudes

LOOKAHEAD TIME 600 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	13704	5424	4416	420
Avg. Horz. Error	4.44	5.65	6.55	4.77
Stddev. Horz. Error	5.07	5.82	5.95	4.14
Max. Horz. Error	125.68	75.37	40.39	23.41
Min. Horz. Error	0.02	0.03	0.03	0.05
Avg. Lat. Error	-0.2	-0.05	-0.3	0.64
Stddev. Lat. Error	5.45	5.19	5.75	4.32
Max. Lat. Error	97.45	62.46	33.91	20.91
Min. Lat. Error	-56.31	-61.74	-37.42	-12.73
Avg. Abs. Lat. Error	2.82	2.77	3.16	2.59
Stddev. Abs. Lat. Error	4.67	4.39	4.81	3.51
Max. Abs. Lat. Error	97.45	62.46	37.42	20.91
Min. Abs. Lat. Error	0	0	0	0.01
Avg. Long. Error	0.05	-0.26	2.04	0.68
Stddev. Long. Error	3.95	6.24	6.4	4.52
Max. Long. Error	91.73	73.8	31.85	21.33
Min. Long. Error	-79.36	-75.35	-32.6	-14.82
Avg. Abs. Long. Error	2.54	4.07	4.75	3.21
Stddev. Abs. Long. Error	3.03	4.73	4.75	3.24
Max. Abs. Long. Error	91.73	75.35	32.6	21.33
Min. Abs. Long. Error	0	0	0	0.01
Avg. Vert. Error	-177.75	-508.57	473.21	169.75
Stddev. Vert. Error	1241.07	2752.91	2422.84	1934.9
Max. Vert. Error	20728.9	28933	20033	8000
Min. Vert. Error	-10000	-15373.8	-10295.8	-8500
Avg. Abs. Vert. Error	436.68	1826.53	1279.1	1087.2
Stddev. Abs. Vert. Error	1175.23	2121.4	2111.32	1608.69
Max. Abs. Vert. Error	20728.9	28933	20033	8500
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.45	5.69	6.57	4.78
Stddev. Slant Range Error	5.07	5.81	5.94	4.14
Max. Slant Range Error	125.72	75.37	40.39	23.41
Min. Slant Range Error	0.02	0.08	0.03	0.05

Figure A.1- 45 Descriptive Statistics for Flight Types at Look Ahead Time of 600 and Samples at All Altitudes

LOOKAHEAD TIME 900 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	11200	3996	3052	281
Avg. Horz. Error	6.01	7.47	9.01	6.14
Stddev. Horz. Error	6.89	7.29	8.25	4.99
Max. Horz. Error	167.79	92.08	71.45	22.86
Min. Horz. Error	0.02	0.05	0.06	0.09
Avg. Lat. Error	-0.31	0.13	-0.47	1.32
Stddev. Lat. Error	7.16	5.95	7.63	5.14
Max. Lat. Error	129.48	64.16	43.07	22.69
Min. Lat. Error	-94.55	-56.43	-71.04	-13.74
Avg. Abs. Lat. Error	3.62	3.17	4.07	3.16
Stddev. Abs. Lat. Error	6.19	5.04	6.48	4.26
Max. Abs. Lat. Error	129.48	64.16	71.04	22.69
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.13	-0.29	2.96	1.19
Stddev. Long. Error	5.67	8.57	9.05	5.76
Max. Long. Error	94.25	66.05	51.09	21.86
Min. Long. Error	-106.71	-70.79	-49.88	-16.05
Avg. Abs. Long. Error	3.63	5.74	6.71	4.24
Stddev. Abs. Long. Error	4.37	6.37	6.76	4.07
Max. Abs. Long. Error	106.71	70.79	51.09	21.86
Min. Abs. Long. Error	0	0	0	0.01
Avg. Vert. Error	-222.75	-437.71	271.32	56.89
Stddev. Vert. Error	1455.74	2965.71	2128.41	1880.16
Max. Vert. Error	30746.5	22083	15458.53	6881.69
Min. Vert. Error	-10050	-16419.3	-9797.11	-8383
Avg. Abs. Vert. Error	523.1	2001.31	1096.37	1143.82
Stddev. Abs. Vert. Error	1376.64	2231.77	1844.28	1491.74
Max. Abs. Vert. Error	30746.5	22083	15458.53	8383
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	6.02	7.5	9.02	6.16
Stddev. Slant Range Error	6.88	7.28	8.24	4.98
Max. Slant Range Error	167.86	92.08	71.45	22.86
Min. Slant Range Error	0.03	0.05	0.06	0.15

Figure A.1- 46 Descriptive Statistics for Flight Types at Look Ahead Time of 900 and Samples at All Altitudes

LOOKAHEAD TIME 1200 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	8886	2752	2023	175
Avg. Horz. Error	7.4	8.89	11.2	6.85
Stddev. Horz. Error	8.41	8.69	10.58	4.94
Max. Horz. Error	173.62	78	93.06	22.45
Min. Horz. Error	0.02	0.11	0.05	0.26
Avg. Lat. Error	-0.34	0.45	-0.78	2.14
Stddev. Lat. Error	8.56	6.91	9.66	4.82
Max. Lat. Error	134.87	53.61	46.16	18.81
Min. Lat. Error	-124.94	-61.74	-91.33	-11.86
Avg. Abs. Lat. Error	4.23	3.46	4.86	3.38
Stddev. Abs. Lat. Error	7.45	6	8.38	4.05
Max. Abs. Lat. Error	134.87	61.74	91.33	18.81
Min. Abs. Lat. Error	0	0	0	0.01
Avg. Long. Error	0.32	-0.24	3.57	1.29
Stddev. Long. Error	7.22	10.32	11.44	6.48
Max. Long. Error	96.16	52.72	65.93	21.87
Min. Long. Error	-109.33	-77.99	-62.47	-16.17
Avg. Abs. Long. Error	4.71	7.06	8.43	5.06
Stddev. Abs. Long. Error	5.48	7.54	8.52	4.24
Max. Abs. Long. Error	109.33	77.99	65.93	21.87
Min. Abs. Long. Error	0	0.01	0	0.03
Avg. Vert. Error	-237.76	-266.5	32.54	19.2
Stddev. Vert. Error	1722.27	3142.5	1905.68	2148.85
Max. Vert. Error	37473.73	16051.78	12600.17	5740.39
Min. Vert. Error	-12399.1	-15900	-10713.8	-8500
Avg. Abs. Vert. Error	633.63	2172.19	913.39	1384.14
Stddev. Abs. Vert. Error	1619.02	2286.1	1672.71	1640.45
Max. Abs. Vert. Error	37473.73	16051.78	12600.17	8500
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	7.41	8.92	11.2	6.86
Stddev. Slant Range Error	8.41	8.68	10.58	4.93
Max. Slant Range Error	173.7	78.01	93.06	22.45
Min. Slant Range Error	0.02	0.14	0.05	0.33

Figure A.1- 47 Descriptive Statistics for Flight Types at Look Ahead Time of 1200 and Samples at All Altitudes

LOOKAHEAD TIME 1500 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	6640	1694	1243	101
Avg. Horz. Error	8.56	9.92	13.03	7.01
Stddev. Horz. Error	9.56	9.65	12.6	4.64
Max. Horz. Error	156.35	67.23	111.55	17.63
Min. Horz. Error	0.01	0.14	0.11	0.09
Avg. Lat. Error	-0.42	0.97	-1.18	2.56
Stddev. Lat. Error	9.56	8.28	10.73	3.96
Max. Lat. Error	120.34	65.64	57.15	16.08
Min. Lat. Error	-143.49	-49.76	-85.38	-3.86
Avg. Abs. Lat. Error	4.59	4.09	5.3	3
Stddev. Abs. Lat. Error	8.39	7.26	9.4	3.64
Max. Abs. Lat. Error	143.49	65.64	85.38	16.08
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.34	0.14	4.1	0.85
Stddev. Long. Error	8.55	11.05	13.98	6.93
Max. Long. Error	97.63	45.17	81.43	14.52
Min. Long. Error	-99.82	-56.73	-71.79	-17.58
Avg. Abs. Long. Error	5.72	7.67	10.26	5.5
Stddev. Abs. Long. Error	6.37	7.95	10.35	4.27
Max. Abs. Long. Error	99.82	56.73	81.43	17.58
Min. Abs. Long. Error	0	0	0	0.03
Avg. Vert. Error	-276.73	-380.65	-114.87	-226.58
Stddev. Vert. Error	1926.48	3273.2	1894.15	1874.91
Max. Vert. Error	38907.87	13000	10800.18	4711.27
Min. Vert. Error	-11065.7	-17219.3	-8000	-8383
Avg. Abs. Vert. Error	766.3	2367.34	882.97	1161.07
Stddev. Abs. Vert. Error	1789.03	2291.55	1679.51	1485.11
Max. Abs. Vert. Error	38907.87	17219.3	10800.18	8383
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	8.57	9.95	13.04	7.02
Stddev. Slant Range Error	9.56	9.64	12.6	4.64
Max. Slant Range Error	156.48	67.26	111.55	17.63
Min. Slant Range Error	0.01	0.16	0.11	0.21

Figure A.1- 48 Descriptive Statistics for Flight Types at Look Ahead Time of 1500 and Samples at All Altitudes

	LOOKAHEAD TIME 1800 Seconds			
Flight type	OVR	ARR	DEP	INR
Sample Quantity	4686	923	774	61
Avg. Horz. Error	9.46	10.3	14.38	8.64
Stddev. Horz. Error	10.33	10.3	13.92	5.68
Max. Horz. Error	169.84	72.73	112.98	21.74
Min. Horz. Error	0.04	0.22	0.15	1.21
Avg. Lat. Error	-0.48	1.85	-1.31	2.45
Stddev. Lat. Error	10.09	9.36	10.66	2.84
Max. Lat. Error	117.09	72.43	28.96	10.43
Min. Lat. Error	-155.99	-39.14	-91.1	-1.15
Avg. Abs. Lat. Error	4.72	4.61	5.24	2.53
Stddev. Abs. Lat. Error	8.93	8.35	9.37	2.77
Max. Abs. Lat. Error	155.99	72.43	91.1	10.43
Min. Abs. Lat. Error	0	0	0	0.06
Avg. Long. Error	0.21	1.08	4.63	1.35
Stddev. Long. Error	9.7	10.96	16.25	9.6
Max. Long. Error	98.01	41.28	81.38	16.86
Min. Long. Error	-78.53	-64.35	-66.82	-19.44
Avg. Abs. Long. Error	6.62	7.74	11.85	7.81
Stddev. Abs. Long. Error	7.09	7.83	12.03	5.66
Max. Abs. Long. Error	98.01	64.35	81.38	19.44
Min. Abs. Long. Error	0	0.02	0.01	0.46
Avg. Vert. Error	-306.19	-554.83	-193.89	-182.77
Stddev. Vert. Error	2109.86	3315.83	1909.9	1606.16
Max. Vert. Error	31668.16	14399.68	8660.28	2772.54
Min. Vert. Error	-12044.6	-15800	-8416.04	-5355.93
Avg. Abs. Vert. Error	882.07	2398.38	867.36	1093.59
Stddev. Abs. Vert. Error	1940.89	2354.66	1712.32	1182.3
Max. Abs. Vert. Error	31668.16	15800	8660.28	5355.93
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	9.48	10.32	14.39	8.65
Stddev. Slant Range Error	10.32	10.29	13.91	5.68
Max. Slant Range Error	169.84	72.73	112.98	21.75
Min. Slant Range Error	0.04	0.23	0.15	1.21

Figure A.1- 49 Descriptive Statistics for Flight Types at Look Ahead Time of 1800 and Samples at All Altitudes

LOOKAHEAD TIME 0 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	17817	4349	3954	28
Avg. Horz. Error	1.15	1.05	1.19	0.72
Stddev. Horz. Error	0.98	0.78	0.95	0.53
Max. Horz. Error	42.39	5.75	11.93	1.97
Min. Horz. Error	0	0	0	0.09
Avg. Lat. Error	-0.03	0.02	-0.08	0.2
Stddev. Lat. Error	1.22	1.09	1.21	0.52
Max. Lat. Error	32.23	4.06	5.21	1.93
Min. Lat. Error	-6.04	-5.33	-5.18	-1.34
Avg. Abs. Lat. Error	0.81	0.74	0.86	0.34
Stddev. Abs. Lat. Error	0.92	0.8	0.85	0.44
Max. Abs. Lat. Error	32.23	5.33	5.21	1.93
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.03	-0.08	0.06	-0.01
Stddev. Long. Error	0.88	0.71	0.93	0.71
Max. Long. Error	9.46	4.3	11.93	1.59
Min. Long. Error	-27.53	-4.6	-11.19	-1.16
Avg. Abs. Long. Error	0.6	0.55	0.61	0.54
Stddev. Abs. Long. Error	0.64	0.46	0.71	0.45
Max. Abs. Long. Error	27.53	4.6	11.93	1.59
Min. Abs. Long. Error	0	0	0	0.01
Avg. Vert. Error	32.33	33.57	73.39	65.94
Stddev. Vert. Error	510.26	678.37	796.74	408.62
Max. Vert. Error	26434.39	36817	28933	1055.33
Min. Vert. Error	-2264.79	-2045.36	-2800	-817.64
Avg. Abs. Vert. Error	97.56	210.85	232.04	226.69
Stddev. Abs. Vert. Error	501.89	645.64	765.72	343.78
Max. Abs. Vert. Error	26434.39	36817	28933	1055.33
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	1.15	1.05	1.2	0.72
Stddev. Slant Range Error	0.98	0.78	0.96	0.53
Max. Slant Range Error	42.39	6.06	11.93	1.97
Min. Slant Range Error	0	0	0	0.09

Figure A.1- 50 Descriptive Statistics for Flight Types at Look Ahead Time of 0 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 300 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	15321	3239	3913	27
Avg. Horz. Error	2.83	3.66	4.16	3.34
Stddev. Horz. Error	3.17	4.6	3.68	2.56
Max. Horz. Error	84.31	65.56	29.61	9.35
Min. Horz. Error	0.01	0.02	0.02	0.03
Avg. Lat. Error	-0.07	-0.13	-0.31	0.16
Stddev. Lat. Error	3.59	4.42	4.05	1.01
Max. Lat. Error	65.49	27.77	26.17	2.21
Min. Lat. Error	-36.73	-39.47	-23.37	-2.91
Avg. Abs. Lat. Error	1.91	2.28	2.26	0.64
Stddev. Abs. Lat. Error	3.05	3.79	3.37	0.79
Max. Abs. Lat. Error	65.49	39.47	26.17	2.91
Min. Abs. Lat. Error	0	0	0	0.01
Avg. Long. Error	-0.02	-0.36	1.1	1.76
Stddev. Long. Error	2.27	3.86	3.62	3.73
Max. Long. Error	25.52	23.81	20.1	9.35
Min. Long. Error	-53.1	-65.39	-16.88	-4.1
Avg. Abs. Long. Error	1.53	2.22	2.78	3.11
Stddev. Abs. Long. Error	1.68	3.19	2.58	2.65
Max. Abs. Long. Error	53.1	65.39	20.1	9.35
Min. Abs. Long. Error	0	0	0	0.01
Avg. Vert. Error	-62.08	198.19	402.09	2824.39
Stddev. Vert. Error	955.2	2171.12	2092.56	3199.69
Max. Vert. Error	14714.2	34817	14101	9842.23
Min. Vert. Error	-9667	-9892.71	-10304.6	-1000
Avg. Abs. Vert. Error	317.63	1226.61	1151.8	3036.92
Stddev. Abs. Vert. Error	902.98	1802.22	1792.63	2990.73
Max. Abs. Vert. Error	14714.2	34817	14101	9842.23
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	2.84	3.69	4.18	3.48
Stddev. Slant Range Error	3.17	4.59	3.67	2.46
Max. Slant Range Error	84.34	65.56	29.61	9.35
Min. Slant Range Error	0.01	0.04	0.06	0.88

Figure A.1- 51 Descriptive Statistics for Flight Types at Look Ahead Time of 300 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 600 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	12874	2180	3140	16
Avg. Horz. Error	4.55	5.87	7.51	7.05
Stddev. Horz. Error	5.18	6.7	6.32	6.02
Max. Horz. Error	125.68	75.37	40.39	19.11
Min. Horz. Error	0.02	0.05	0.03	0.56
Avg. Lat. Error	-0.18	-0.17	-0.52	0.7
Stddev. Lat. Error	5.59	6.26	6.37	1.85
Max. Lat. Error	97.45	62.46	33.91	6.81
Min. Lat. Error	-56.31	-61.74	-37.42	-1.68
Avg. Abs. Lat. Error	2.9	3.27	3.56	1.02
Stddev. Abs. Lat. Error	4.79	5.34	5.3	1.68
Max. Abs. Lat. Error	97.45	62.46	37.42	6.81
Min. Abs. Lat. Error	0	0	0	0.01
Avg. Long. Error	0.04	-0.55	2.5	4.59
Stddev. Long. Error	4.02	6.3	7.02	7.93
Max. Long. Error	91.73	26.87	31.85	19.01
Min. Long. Error	-79.36	-75.35	-28.52	-4.76
Avg. Abs. Long. Error	2.59	3.89	5.48	6.85
Stddev. Abs. Long. Error	3.08	4.99	5.05	5.94
Max. Abs. Long. Error	91.73	75.35	31.85	19.01
Min. Abs. Long. Error	0	0	0	0.52
Avg. Vert. Error	-168.77	175.38	627.24	3707.17
Stddev. Vert. Error	1227.7	2729.41	2684.06	3264.89
Max. Vert. Error	20728.9	28933	20033	8000
Min. Vert. Error	-10000	-10552	-9233	-1000
Avg. Abs. Vert. Error	426.3	1703.61	1525.93	3934.42
Stddev. Abs. Vert. Error	1163.61	2139.35	2295.33	2967.69
Max. Abs. Vert. Error	20728.9	28933	20033	8000
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.56	5.9	7.53	7.16
Stddev. Slant Range Error	5.18	6.68	6.31	5.94
Max. Slant Range Error	125.72	75.37	40.39	19.11
Min. Slant Range Error	0.02	0.08	0.03	0.7

Figure A.1- 52 Descriptive Statistics for Flight Types at Look Ahead Time of 600 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 900 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	10484	1330	2151	7
Avg. Horz. Error	6.18	7.69	10.51	5.47
Stddev. Horz. Error	7.05	8.61	8.73	7.42
Max. Horz. Error	167.79	92.08	71.45	21.97
Min. Horz. Error	0.03	0.06	0.09	0.98
Avg. Lat. Error	-0.26	0.34	-0.75	0.74
Stddev. Lat. Error	7.36	7.41	8.66	0.76
Max. Lat. Error	129.48	64.16	43.07	2.13
Min. Lat. Error	-94.55	-56.43	-71.04	-0.03
Avg. Abs. Lat. Error	3.74	3.9	4.77	0.75
Stddev. Abs. Lat. Error	6.34	6.31	7.27	0.75
Max. Abs. Lat. Error	129.48	64.16	71.04	2.13
Min. Abs. Lat. Error	0	0	0	0.03
Avg. Long. Error	0.12	-1	3.55	2.14
Stddev. Long. Error	5.79	8.79	9.93	9.14
Max. Long. Error	94.25	66.05	51.09	21.86
Min. Long. Error	-106.71	-70.79	-42.99	-4.77
Avg. Abs. Long. Error	3.7	5.35	7.79	5.4
Stddev. Abs. Long. Error	4.45	7.04	7.11	7.41
Max. Abs. Long. Error	106.71	70.79	51.09	21.86
Min. Abs. Long. Error	0	0	0	0.98
Avg. Vert. Error	-199.89	438.42	409.32	5089.34
Stddev. Vert. Error	1437.65	3093.88	2395.8	1556.09
Max. Vert. Error	30746.5	22083	15458.53	6881.69
Min. Vert. Error	-9700	-10700	-9797.11	3000
Avg. Abs. Vert. Error	504.46	2025.65	1333.17	5089.34
Stddev. Abs. Vert. Error	1361	2378.67	2032.07	1556.09
Max. Abs. Vert. Error	30746.5	22083	15458.53	6881.69
Min. Abs. Vert. Error	0	0	0	3000
Avg. Slant Range Error	6.19	7.72	10.53	5.65
Stddev. Slant Range Error	7.04	8.6	8.72	7.33
Max. Slant Range Error	167.86	92.08	71.45	21.97
Min. Slant Range Error	0.03	0.11	0.09	1.38

Figure A.1- 53 Descriptive Statistics for Flight Types at Look Ahead Time of 900 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 1200 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	8279	729	1365	1
Avg. Horz. Error	7.6	8.71	13.43	2.45
Stddev. Horz. Error	8.61	10.08	11.25	0
Max. Horz. Error	173.62	78	93.06	2.45
Min. Horz. Error	0.02	0.16	0.05	2.45
Avg. Lat. Error	-0.27	1.56	-1.21	0.44
Stddev. Lat. Error	8.81	8.46	11.38	0
Max. Lat. Error	134.87	53.61	46.16	0.44
Min. Lat. Error	-124.94	-61.74	-91.33	0.44
Avg. Abs. Lat. Error	4.37	4.43	6.06	0.44
Stddev. Abs. Lat. Error	7.65	7.37	9.7	0
Max. Abs. Lat. Error	134.87	61.74	91.33	0.44
Min. Abs. Lat. Error	0	0	0	0.44
Avg. Long. Error	0.3	-0.39	4.48	-2.41
Stddev. Long. Error	7.37	10.18	12.49	0
Max. Long. Error	96.16	52.53	65.93	-2.41
Min. Long. Error	-109.33	-77.99	-46.22	-2.41
Avg. Abs. Long. Error	4.82	6.06	9.88	2.41
Stddev. Abs. Long. Error	5.59	8.18	8.85	0
Max. Abs. Long. Error	109.33	77.99	65.93	2.41
Min. Abs. Long. Error	0	0.01	0	2.41
Avg. Vert. Error	-198.02	579.37	104.24	5507.95
Stddev. Vert. Error	1698.4	3291.49	2134.86	0
Max. Vert. Error	37473.73	16051.78	12600.17	5507.95
Min. Vert. Error	-8800	-9350	-10485.7	5507.95
Avg. Abs. Vert. Error	605.09	2138.76	1086.58	5507.95
Stddev. Abs. Vert. Error	1599.25	2567	1840.37	0
Max. Abs. Vert. Error	37473.73	16051.78	12600.17	5507.95
Min. Abs. Vert. Error	0	0	0	5507.95
Avg. Slant Range Error	7.61	8.75	13.43	2.61
Stddev. Slant Range Error	8.61	10.06	11.25	0
Max. Slant Range Error	173.7	78.01	93.06	2.61
Min. Slant Range Error	0.02	0.16	0.05	2.61

Figure A.1- 54 Descriptive Statistics for Flight Types at Look Ahead Time of 1200 and Samples at Altitudes Above 18,000 Feet

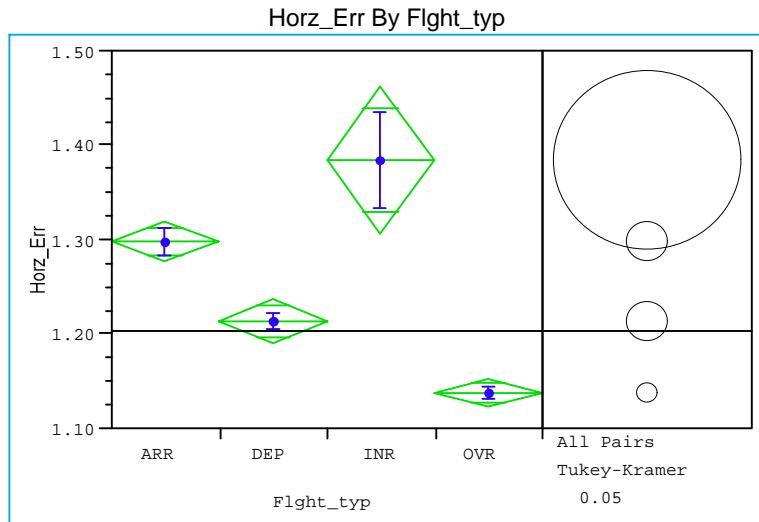
LOOKAHEAD TIME 1500 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	6125	385	797	0
Avg. Horz. Error	8.81	9.26	16.24	0
Stddev. Horz. Error	9.83	10.56	13.8	0
Max. Horz. Error	156.35	67.23	111.55	0
Min. Horz. Error	0.01	0.22	0.16	0
Avg. Lat. Error	-0.34	2.24	-1.99	0
Stddev. Lat. Error	9.87	9.38	12.89	0
Max. Lat. Error	120.34	65.64	57.15	0
Min. Lat. Error	-143.49	-49.76	-85.38	0
Avg. Abs. Lat. Error	4.75	4.81	6.85	0
Stddev. Abs. Lat. Error	8.66	8.35	11.1	0
Max. Abs. Lat. Error	143.49	65.64	85.38	0
Min. Abs. Lat. Error	0	0.02	0	0
Avg. Long. Error	0.31	0.18	5.52	0
Stddev. Long. Error	8.76	10.22	15.94	0
Max. Long. Error	97.63	36.7	81.43	0
Min. Long. Error	-99.82	-56.73	-71.79	0
Avg. Abs. Long. Error	5.86	6.36	12.58	0
Stddev. Abs. Long. Error	6.52	8	11.22	0
Max. Abs. Long. Error	99.82	56.73	81.43	0
Min. Abs. Long. Error	0	0.01	0.07	0
Avg. Vert. Error	-221.3	640.74	-159.15	0
Stddev. Vert. Error	1908.58	3153.86	2153.44	0
Max. Vert. Error	38907.87	13000	10800.18	0
Min. Vert. Error	-9483.61	-7073.06	-7833	0
Avg. Abs. Vert. Error	729.55	2145.71	1053.36	0
Stddev. Abs. Vert. Error	1777.45	2396.32	1884.6	0
Max. Abs. Vert. Error	38907.87	13000	10800.18	0
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	8.82	9.29	16.25	0
Stddev. Slant Range Error	9.83	10.54	13.8	0
Max. Slant Range Error	156.48	67.26	111.55	0
Min. Slant Range Error	0.01	0.22	0.16	0

Figure A.1- 55 Descriptive Statistics for Flight Types at Look Ahead Time of 1500 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 1800 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	4246	192	453	0
Avg. Horz. Error	9.77	9.89	18.89	0
Stddev. Horz. Error	10.69	11.35	15.51	0
Max. Horz. Error	169.84	65.77	112.98	0
Min. Horz. Error	0.04	0.28	0.19	0
Avg. Lat. Error	-0.36	2.46	-2.42	0
Stddev. Lat. Error	10.48	9.21	13.26	0
Max. Lat. Error	117.09	53.61	28.96	0
Min. Lat. Error	-155.99	-12.52	-91.1	0
Avg. Abs. Lat. Error	4.88	4.87	7.05	0
Stddev. Abs. Lat. Error	9.28	8.19	11.49	0
Max. Abs. Lat. Error	155.99	53.61	91.1	0
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.12	-0.28	7.36	0
Stddev. Long. Error	9.99	11.67	19.03	0
Max. Long. Error	98.01	41.28	81.38	0
Min. Long. Error	-78.53	-64.35	-66.82	0
Avg. Abs. Long. Error	6.82	6.8	15.42	0
Stddev. Abs. Long. Error	7.29	9.47	13.34	0
Max. Abs. Long. Error	98.01	64.35	81.38	0
Min. Abs. Long. Error	0	0.1	0.01	0
Avg. Vert. Error	-214.25	915.07	-325	0
Stddev. Vert. Error	2071.27	3306.58	2054.36	0
Max. Vert. Error	31668.16	14399.68	8660.28	0
Min. Vert. Error	-10550	-5633	-7900	0
Avg. Abs. Vert. Error	823.12	2281.02	964.54	0
Stddev. Abs. Vert. Error	1912.69	2558.31	1842.24	0
Max. Abs. Vert. Error	31668.16	14399.68	8660.28	0
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	9.78	9.92	18.89	0
Stddev. Slant Range Error	10.68	11.34	15.51	0
Max. Slant Range Error	169.84	65.81	112.98	0
Min. Slant Range Error	0.04	0.69	0.39	0

Figure A.1- 56 Descriptive Statistics for Flight Types at Look Ahead Time of 1800 and Samples at Altitudes Above 18,000 Feet

A.1.2.2 Statistical Tests



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	8448	1.30677	1.39839	0.01521
DEP	7726	1.21862	0.91280	0.01038
INR	739	1.39209	1.39924	0.05147
OVR	19015	1.14659	0.96289	0.00698

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	DEP	OVR
INR	0.000000	0.085314	0.173462	0.245493
ARR	-0.08531	0.000000	0.088149	0.160180
DEP	-0.17346	-0.08815	0.000000	0.072031
OVR	-0.24549	-0.16018	-0.07203	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
q* = 2.56915				
Abs(Dif)-LSD	INR	ARR	DEP	OVR
INR	-0.14456	-0.02129	0.066462	0.141303
ARR	-0.02129	-0.04276	0.044404	0.123845
DEP	0.066462	0.044404	-0.04471	0.034540
OVR	0.141303	0.123845	0.034540	-0.0285

Positive values show pairs of means that are significantly different.

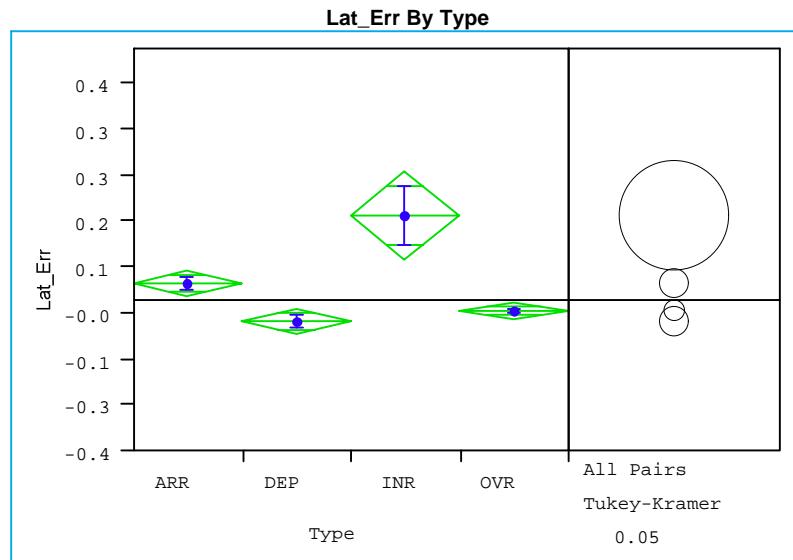
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	8448	1.398387	0.8735268	0.8128893
DEP	7726	0.912805	0.6773466	0.6614614
INR	739	1.399239	0.8921797	0.8410334
OVR	19015	0.962894	0.6522515	0.6309438

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	20.6626	3	35924	<.0001
Brown-Forsythe	94.8825	3	35924	<.0001
Levene	164.7150	3	35924	<.0001
Bartlett	774.7981	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
40.1530	3	3346.9	<.0001

Figure A.1- 57 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 0 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	8448	0.027652	1.61241	0.01754
DEP	7726	-0.0661	1.25060	0.01423
INR	739	0.172656	1.76404	0.06489
OVR	19015	-0.03539	1.22071	0.00885

Dif=Mean[i]-Mean[j]	Means Comparisons			
	INR	ARR	OVR	DEP
INR	0.000000	0.145004	0.208051	0.238760
ARR	-0.145	0.000000	0.063046	0.093756
OVR	-0.20805	-0.06305	0.000000	0.030710
DEP	-0.23876	-0.09376	-0.03071	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56915$	
Abs(Dif)-LSD	
INR	-0.17933
ARR	0.012769
OVR	0.078805
DEP	0.106029
INR	0.012769
ARR	-0.05304
OVR	0.017974
DEP	0.039492
INR	0.078805
ARR	-0.03535
OVR	-0.0158
DEP	-0.05546

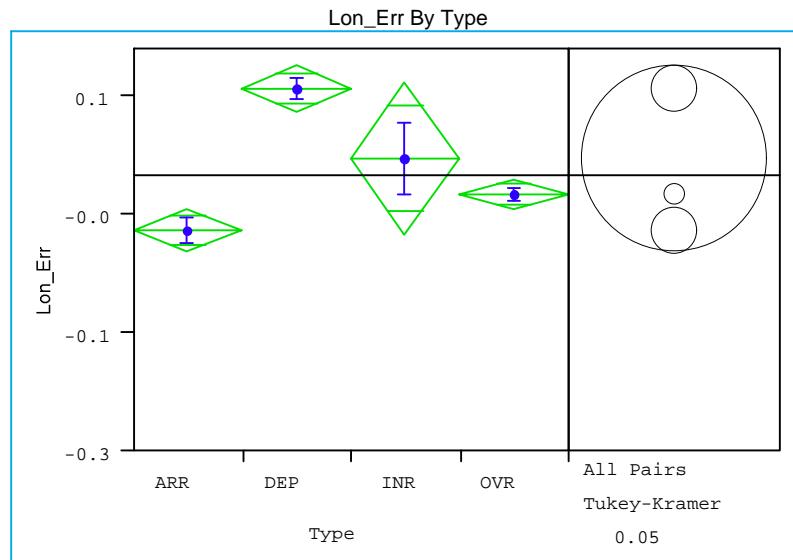
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal			MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	DF Num	
ARR	8448	1.612409	0.939075	35924	0.938874
DEP	7726	1.250601	0.915938	35924	0.914665
INR	739	1.764038	1.120226	35924	1.119173
OVR	19015	1.220712	0.813887	35924	0.813112

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	44.6490	3	35924	<.0001
Brown-Forsythe	52.2906	3	35924	<.0001
Levene	52.3370	3	35924	<.0001
Bartlett	391.0798	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	9.1155	3	3346.5	<.0001

Figure A.1- 58 Statistical Tests for Lateral Error and Flight Type at Look Ahead 0 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	8448	-0.06119	1.02906	0.01120
DEP	7726	0.059377	0.86403	0.00983
INR	739	-0.00021	0.86989	0.03200
OVR	19015	-0.02707	0.86590	0.00628

Dif=Mean[i]-Mean[j]	Means Comparisons			
	DEP	INR	OVR	ARR
DEP	0.000000	0.059585	0.086450	0.120567
INR	-0.05959	0.000000	0.026864	0.060982
OVR	-0.08645	-0.02686	0.000000	0.034117
ARR	-0.12057	-0.06098	-0.03412	0.000000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

$q^* = 2.56915$

Abs(Dif)-LSD	DEP			ARR
	INR	OVR	ARR	ARR
DEP	-0.03748	-0.0301	0.055025	0.083901
INR	-0.0301	-0.12117	-0.06047	-0.02837
OVR	0.055025	-0.06047	-0.02389	0.003663
ARR	0.083901	-0.02837	0.003663	-0.03584

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

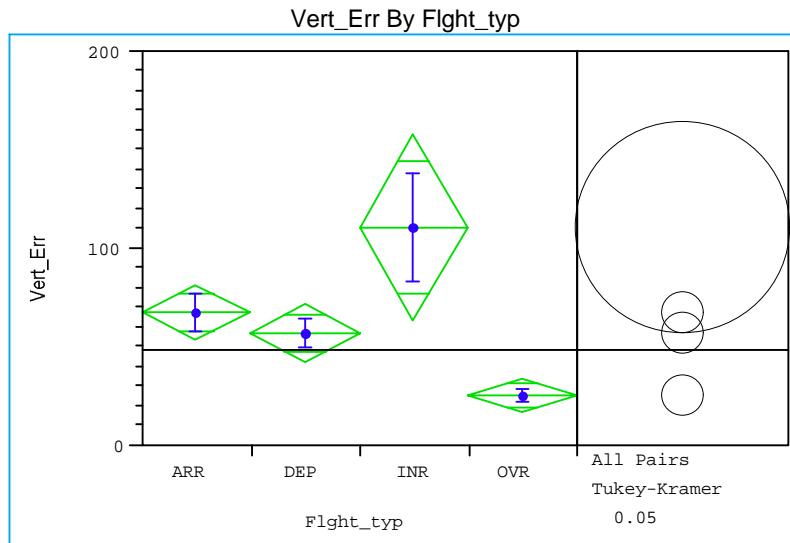
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
ARR	8448	1.029061		0.6658010	0.6657831
DEP	7726	0.864030		0.5779702	0.5778819
INR	739	0.869889		0.5829329	0.5829153
OVR	19015	0.865901		0.5939413	0.5938627

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	5.5325	3	35924	0.0009
Brown-Forsythe	29.0760	3	35924	<.0001
Levene	29.0404	3	35924	<.0001
Bartlett	136.8188	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
25.9604	3	3418.8	<.0001

Figure A.1- 59 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	8448	70.188	925.088	10.065
DEP	7726	61.550	660.830	7.518
INR	739	121.234	758.396	27.898
OVR	19015	32.353	499.734	3.624

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	DEP	OVR
INR	0.0000	51.0458	59.6838	88.8804
ARR	-51.0458	0.0000	8.6380	37.8346
DEP	-59.6838	-8.6380	0.0000	29.1965
OVR	-88.8804	-37.8346	-29.1965	0.0000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
$q^* = 2.56915$				
Abs(Dif)-LSD	INR	ARR	DEP	OVR
INR	-88.5683	-14.2632	-5.8702	25.0478
ARR	-14.2632	-26.1953	-18.1623	15.5741
DEP	-5.8702	-18.1623	-27.3920	6.2272
OVR	25.0478	15.5741	6.2272	-17.4603

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

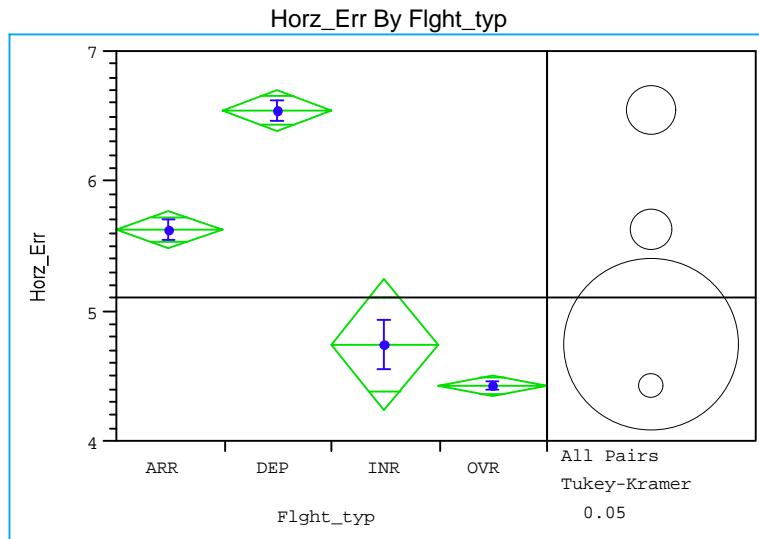
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	8448	925.0881	399.3161	373.8933
DEP	7726	660.8301	279.6681	261.3665
INR	739	758.3961	353.6892	328.3434
OVR	19015	499.7343	122.1939	100.6145

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	6.2275	3	35924	0.0003
Brown-Forsythe	417.0248	3	35924	<.0001
Levene	438.9741	3	35924	<.0001
Bartlett	1646.0411	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
9.9148	3	3305.4	<.0001

Figure A.1- 60 Statistical Tests for Vertical Error and Flight Type at Look Ahead 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5424	5.65443	5.82123	0.07904
DEP	4416	6.54882	5.94563	0.08947
INR	420	4.76544	4.14447	0.20223
OVR	13704	4.43793	5.06903	0.04330

Dif=Mean[i]-Mean[j]	Means Comparisons			
	DEP	ARR	INR	OVR
DEP	0.00000	0.89439	1.78339	2.11089
ARR	-0.89439	0.00000	0.88900	1.21651
INR	-1.78339	-0.88900	0.00000	0.32751
OVR	-2.11089	-1.21651	-0.32751	0.00000

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
$q^* = 2.56921$								
Abs(Dif)-LSD	DEP	ARR	INR	OVR				
DEP	-0.29535	0.61309	1.07472	1.87075				
ARR	0.61309	-0.26650	0.18607	0.99387				
INR	1.07472	0.18607	-0.95770	-0.35999				
OVR	1.87075	0.99387	-0.35999	-0.16766				

Positive values show pairs of means that are significantly different.

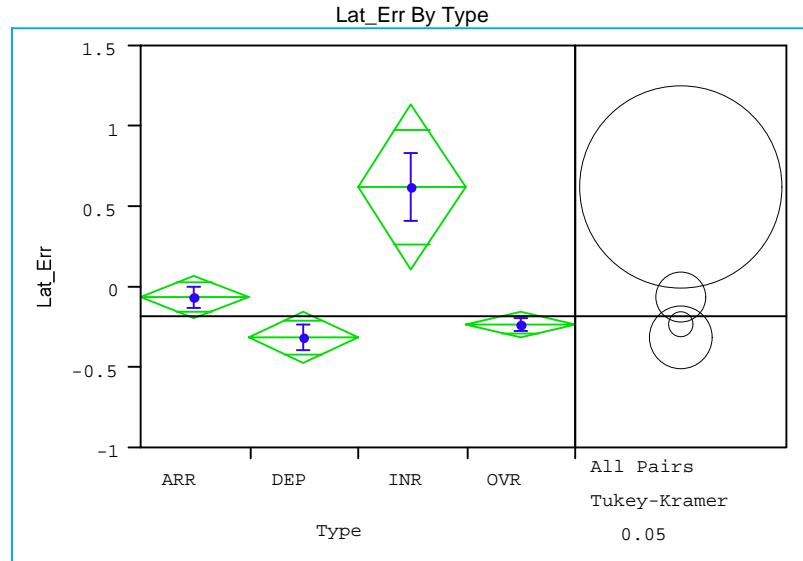
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5424	5.821235	3.814676	3.577853
DEP	4416	5.945632	4.499082	4.253545
INR	420	4.144473	3.068972	2.938459
OVR	13704	5.069030	3.194342	2.906630

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.9006	3	23960	0.0021
Brown-Forsythe	107.3528	3	23960	<.0001
Levene	127.4396	3	23960	<.0001
Bartlett	102.1086	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
179.2093	3	1964.4	<.0001

Figure A.1- 61 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 600 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	5424	-0.04855	5.18728	0.07043
DEP	4416	-0.29545	5.74566	0.08646
INR	420	0.639414	4.31964	0.21078
OVR	13704	-0.204	5.45218	0.04657

Dif=Mean[i]-Mean[j]	Means Comparisons			
	INR	ARR	OVR	DEP
INR	0.000000	0.687965	0.843415	0.934862
ARR	-0.68796	0.000000	0.155450	0.246898
OVR	-0.84342	-0.15545	0.000000	0.091447
DEP	-0.93486	-0.2469	-0.09145	0.000000

Alpha=	Comparisons for all pairs using Tukey-Kramer HSD			
	$q^* = 2.56921$			
Abs(Dif)-LSD	INR	ARR	OVR	DEP
INR	-0.96295	-0.01882	0.152151	0.222308
ARR	-0.01882	-0.26796	-0.0684	-0.03594
OVR	0.152151	-0.0684	-0.16858	-0.15002
DEP	0.222308	-0.03594	-0.15002	-0.29697

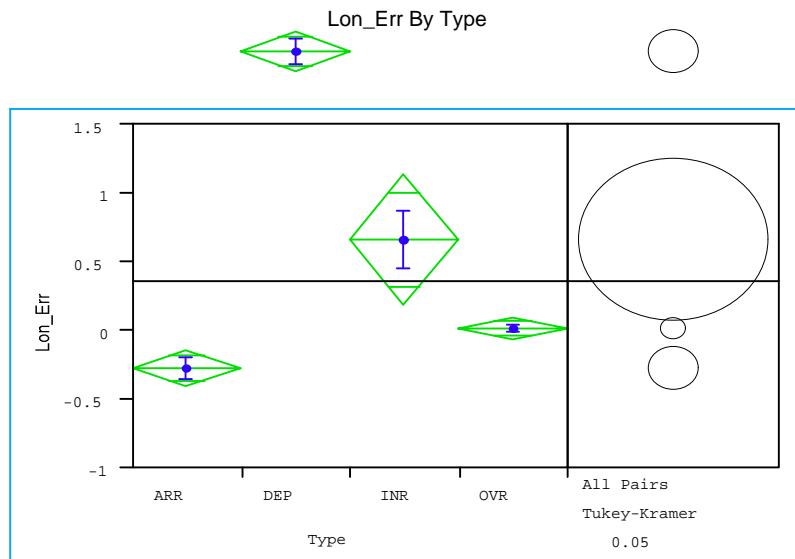
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal			MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	5424	5.187277	2.768101	2.765340	
DEP	4416	5.745658	3.188760	3.155276	
INR	420	4.319640	2.608779	2.566873	
OVR	13704	5.452177	2.840231	2.817599	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.5416	3	23960	0.0545
Brown-Forsythe	7.7254	3	23960	<.0001
Levene	8.5242	3	23960	<.0001
Bartlett	29.8614	3	?	<.0001

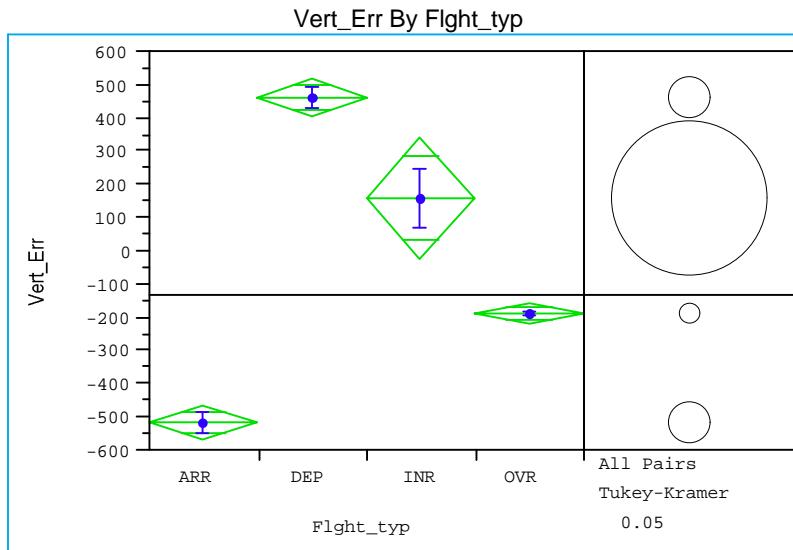
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	6.7387	3	1972.8	0.0002

Figure A.1- 62 Statistical Tests for Lateral Error and Flight Type at Look Ahead 600 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	5424	-0.25745	6.23609	0.08467	
DEP	4416	2.04462	6.40047	0.09632	
INR	420	0.67902	4.51763	0.22044	
OVR	13704	0.05435	3.95233	0.03376	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DEP	INR	OVR	
DEP		0.00000	1.36560	1.99028	
INR		-1.36560	0.00000	0.62467	
OVR		-1.99028	-0.62467	0.00000	
ARR		-2.30208	-0.93647	-0.31180	
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 2.56921$			
Abs(Dif)-LSD		DEP	INR	OVR	
DEP		-0.27687	0.70129	1.76516	
INR		0.70129	-0.89776	-0.01979	
OVR		1.76516	-0.01979	-0.15717	
ARR		2.03839	0.27754	0.10310	
				-0.24982	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	5424	6.236088	4.083972	4.070124	
DEP	4416	6.400468	4.679750	4.616607	
INR	420	4.517630	3.223334	3.200056	
OVR	13704	3.952328	2.541685	2.541273	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		59.7962	3	23960	<.0001
Brown-Forsythe		438.6663	3	23960	<.0001
Levene		468.8180	3	23960	<.0001
Bartlett		852.8624	3	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	139.5878	3	1898.5	<.0001	

Figure A.1- 63 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5424	-508.568	2752.91	37.379
DEP	4416	473.214	2422.84	36.459
INR	420	169.747	1934.90	94.413
OVR	13704	-177.748	1241.07	10.602
Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	OVR	ARR
DEP	0.000	303.467	650.962	981.782
INR	-303.467	0.000	347.495	678.315
OVR	-650.962	-347.495	0.000	330.820
ARR	-981.782	-678.315	-330.820	0.000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	q* = 2.56921			
Abs(Dif)-LSD	DEP	INR	OVR	ARR
DEP	-105.786	49.644	564.948	881.030
INR	49.644	-343.019	101.255	426.548
OVR	564.948	101.255	-60.051	251.079
ARR	881.030	426.548	251.079	-95.452

Positive values show pairs of means that are significantly different.

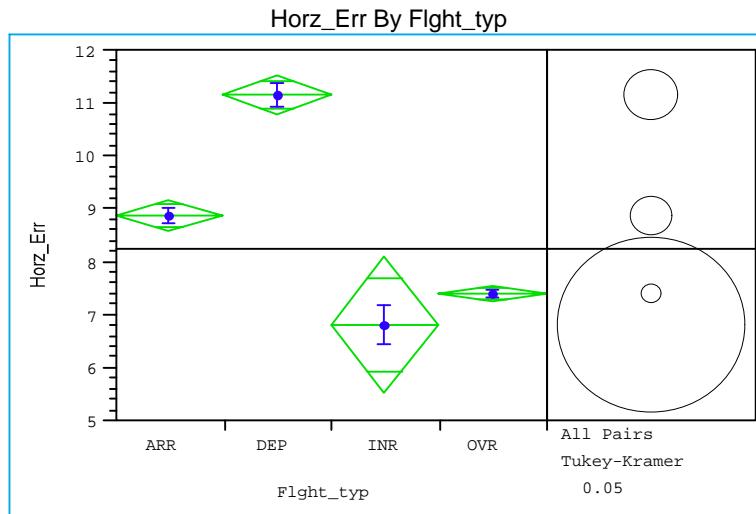
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5424	2752.906	1885.542	1826.528
DEP	4416	2422.842	1473.997	1279.100
INR	420	1934.898	1129.098	1087.200
OVR	13704	1241.074	558.379	436.680

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	288.9470	3	23960	<.0001
Brown-Forsythe	1026.7023	3	23960	0.0000
Levene	1125.4173	3	23960	0.0000
Bartlett	2118.3415	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
134.0774	3	1856.9	<.0001

Figure A.1- 64 Statistical Tests for Vertical Error and Flight Type at Look Ahead 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2752	8.8888	8.6910	0.16567
DEP	2023	11.1970	10.5830	0.23529
INR	175	6.8506	4.9372	0.37322
OVR	8886	7.4045	8.4128	0.08925

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.00000	2.30816	3.79246	4.34642
ARR	-2.30816	0.00000	1.48430	2.03826
OVR	-3.79246	-1.48430	0.00000	0.55396
INR	-4.34642	-2.03826	-0.55396	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
q* = 2.56934				
Abs(Dif)-LSD	DEP	ARR	OVR	INR
DEP	-0.70965	1.64717	3.23647	2.56804
ARR	1.64717	-0.60844	0.99193	0.27873
OVR	3.23647	0.99193	-0.33860	-1.16887
INR	2.56804	0.27873	-1.16887	-2.41282

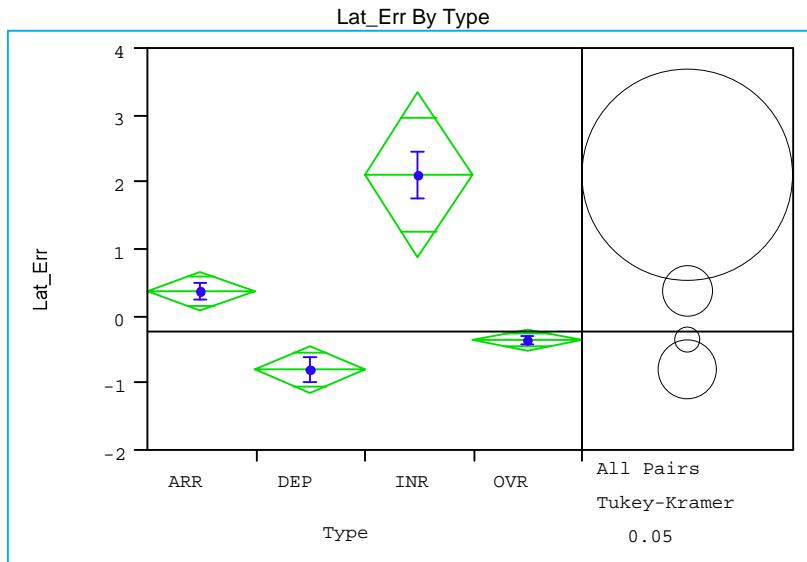
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2752	8.69101	6.045259	5.670412
DEP	2023	10.58296	7.855500	7.408243
INR	175	4.93723	4.010688	3.978116
OVR	8886	8.41275	5.165765	4.768198

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.2481	3	13832	0.0052
Brown-Forsythe	74.8990	3	13832	<.0001
Levene	97.7130	3	13832	<.0001
Bartlett	91.2170	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal			
F Ratio	DF Num	DF Den	Prob>F
88.9024	3	838	<.0001

Figure A.1- 65 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2752	0.44933	6.90750	0.13167
DEP	2023	-0.77607	9.65818	0.21473
INR	175	2.13575	4.82428	0.36468
OVR	8886	-0.33598	8.55880	0.09079

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	OVR	DEP
INR	0.00000	1.68642	2.47173	2.91182
ARR	-1.68642	0.00000	0.78532	1.22540
OVR	-2.47173	-0.78532	0.00000	0.44008
DEP	-2.91182	-1.22540	-0.44008	0.00000

Alpha=	0.05	Comparisons for all pairs using Tukey-Kramer HSD			
Abs(Dif)-LSD		INR	ARR	OVR	DEP
INR	-2.30583	0.00491	0.82529	1.21229	
ARR	0.00491	-0.58146	0.31478	0.59372	
OVR	0.82529	0.31478	-0.32359	-0.09126	
DEP	1.21229	0.59372	-0.09126	-0.67819	

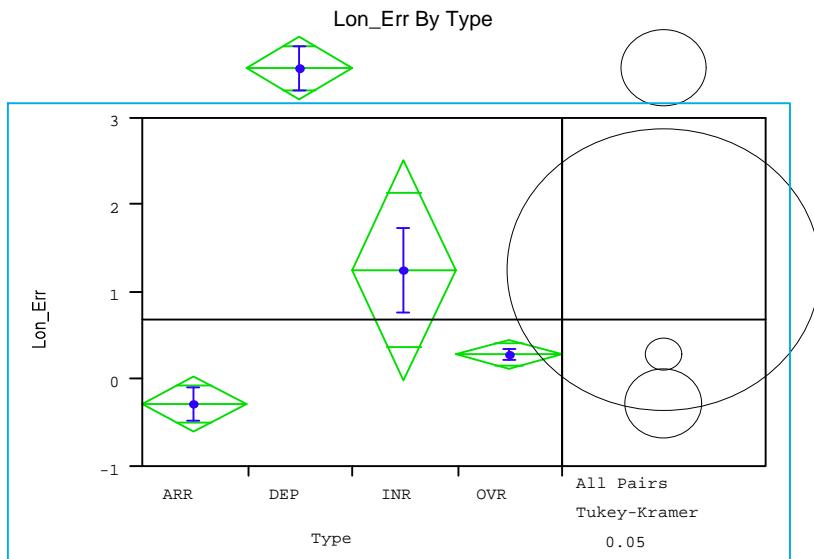
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2752	6.907495	3.510546	3.454990
DEP	2023	9.658175	5.029599	4.861608
INR	175	4.824283	3.566948	3.217192
OVR	8886	8.558796	4.282437	4.228983

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	5.9916	3	13832	0.0004
Brown-Forsythe	16.0369	3	13832	<.0001
Levene	17.9417	3	13832	<.0001
Bartlett	118.2192	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	23.8050	3	840.91	<.0001

Figure A.1- 66 Statistical Tests for Lateral Error and Flight Type at Look Ahead 1200 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	2752	-0.23783	10.3248	0.19681
DEP	2023	3.56685	11.4377	0.25430
INR	175	1.29445	6.4830	0.49007
OVR	8886	0.31763	7.2209	0.07660

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	OVR	ARR
DEP	0.00000	2.27240	3.24922	3.80467
INR	-2.27240	0.00000	0.97682	1.53227
OVR	-3.24922	-0.97682	0.00000	0.55546
ARR	-3.80467	-1.53227	-0.55546	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	DEP	INR	OVR	ARR
DEP	-0.69658	0.52678	2.70347	3.15586
INR	0.52678	-2.36837	-0.71429	-0.19485
OVR	2.70347	-0.71429	-0.33237	0.07216
ARR	3.15586	-0.19485	0.07216	-0.59723

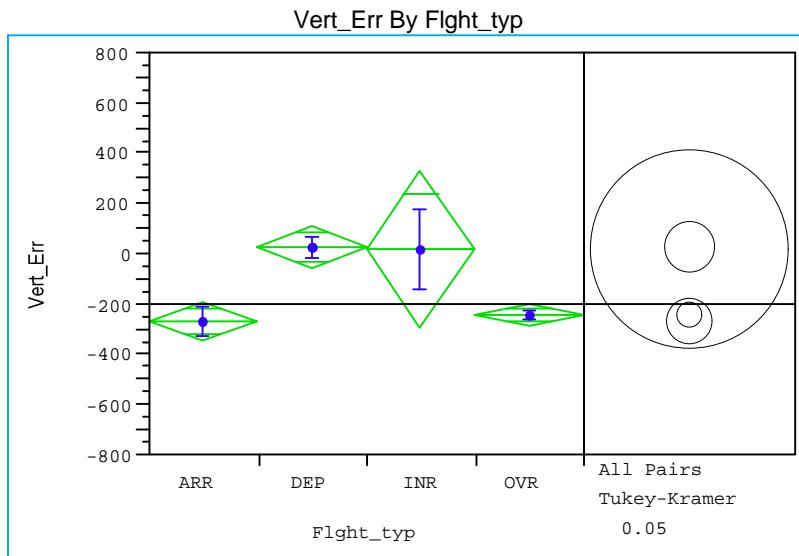
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
ARR	2752	10.32481	7.077953	7.042463
DEP	2023	11.43775	8.120808	8.061091
INR	175	6.48303	5.234365	5.063142
OVR	8886	7.22086	4.702144	4.701919

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	46.8839	3	13832	<.0001
Brown-Forsythe	205.5680	3	13832	<.0001
Levene	215.3588	3	13832	<.0001
Bartlett	372.2710	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	55.8382	3	801.21	<.0001

Figure A.1- 67 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2752	-266.505	3142.50	59.90
DEP	2023	32.538	1905.68	42.37
INR	175	19.197	2148.85	162.44
OVR	8886	-237.760	1722.27	18.27

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	OVR	ARR
DEP	0.000	13.341	270.298	299.042
INR	-13.341	0.000	256.957	285.701
OVR	-270.298	-256.957	0.000	28.745
ARR	-299.042	-285.701	-28.745	0.000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
$q^* = 2.56934$				
Abs(Dif)-LSD	DEP	INR	OVR	ARR
DEP	-170.580	-414.131	136.653	140.160
INR	-414.131	-579.972	-157.164	-137.239
OVR	136.653	-157.164	-81.390	-89.607
ARR	140.160	-137.239	-89.607	-146.252

Positive values show pairs of means that are significantly different.

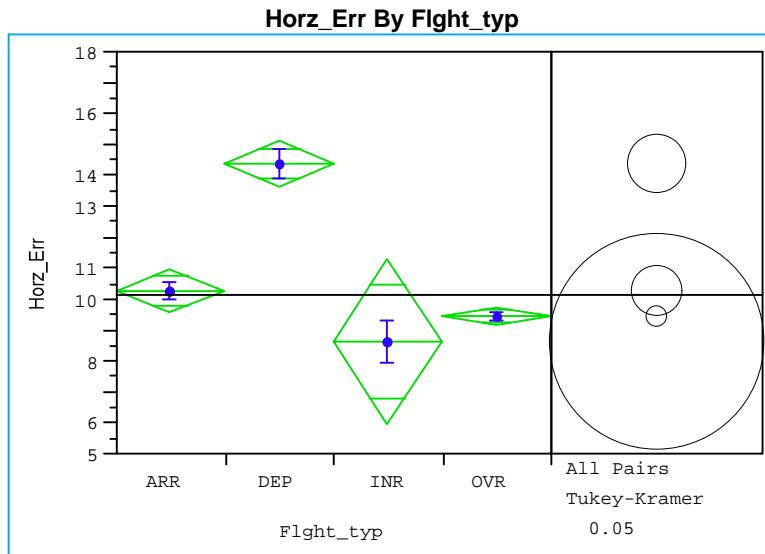
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2752	3142.501	2192.247	2172.187
DEP	2023	1905.676	926.247	913.391
INR	175	2148.850	1385.400	1384.143
OVR	8886	1722.271	784.667	633.630

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	54.8177	3	13832	<.0001
Brown-Forsythe	527.8600	3	13832	0.0000
Levene	478.1322	3	13832	<.0001
Bartlett	613.3899	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
12.4580	3	791.61	<.0001

Figure A.1- 68 Statistical Tests for Vertical Error and Flight Type at Look Ahead 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	923	10.2990	10.3021	0.33910
DEP	774	14.3842	13.9167	0.50022
INR	61	8.6425	5.6802	0.72728
OVR	4686	9.4641	10.3259	0.15084

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.00000	4.08526	4.92009	5.74179
ARR	-4.08526	0.00000	0.83483	1.65653
OVR	-4.92009	-0.83483	0.00000	0.82170
INR	-5.74179	-1.65653	-0.82170	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56970$	
Abs(Dif)-LSD	DEP
DEP	-1.40875
ARR	2.73456
OVR	3.84483
INR	2.05627
ARR	DEP
	2.73456
	-1.29004
	-0.16317
	-2.74966
OVR	DEP
	3.84483
	-0.16317
	-0.57254
	-5.01811
INR	DEP
	2.05627
	-2.00719
	-2.74966

Positive values show pairs of means that are significantly different.

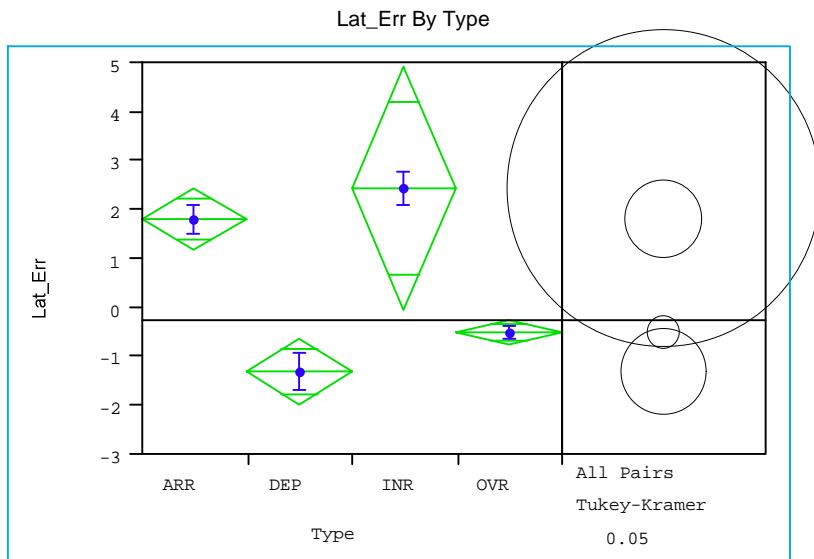
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	923	10.30205	7.13410	6.576544
DEP	774	13.91667	10.19334	9.676541
INR	61	5.68024	4.97916	4.921205
OVR	4686	10.32587	6.34870	5.914651

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.8899	3	6440	0.0021
Brown-Forsythe	38.7993	3	6440	<.0001
Levene	50.2465	3	6440	<.0001
Bartlett	58.0560	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
30.8836	3	285.23	<.0001

Figure A.1- 69 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 1800 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	923	1.84524	9.3618	0.30815
DEP	774	-1.31193	10.6583	0.38310
INR	61	2.45212	2.8399	0.36361
OVR	4686	-0.48365	10.0897	0.14739

Dif=Mean[i]-Mean[j]	Means Comparisons			
	INR	ARR	OVR	DEP
INR	0.00000	0.60688	2.93577	3.76405
ARR	-0.60688	0.00000	2.32889	3.15717
OVR	-2.93577	-2.32889	0.00000	0.82828
DEP	-3.76405	-3.15717	-0.82828	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	INR	ARR	OVR	DEP
INR	-4.66040	-2.79567	-0.38101	0.34126
ARR	-2.79567	-1.19808	1.40203	1.90275
OVR	-0.38101	1.40203	-0.53172	-0.17033
DEP	0.34126	1.90275	-0.17033	-1.30833

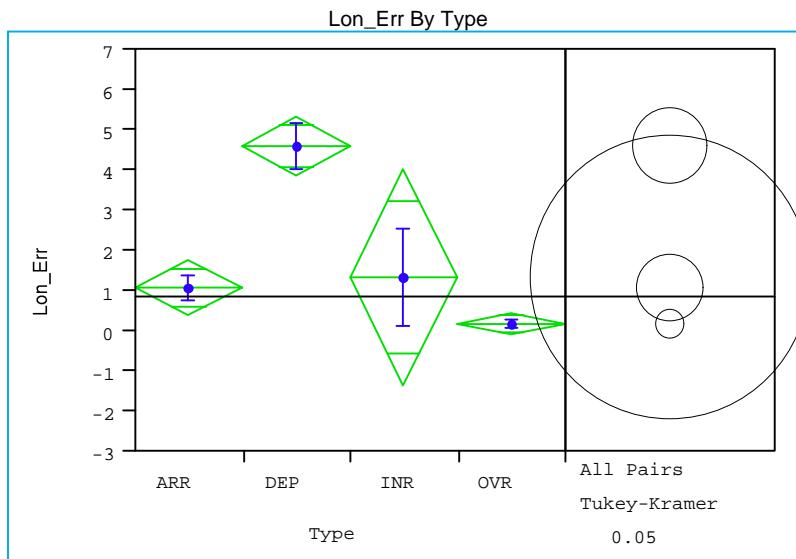
Positive values show pairs of means that are significantly different.

Level	Count	Std Dev	Tests that the Variances are Equal		MeanAbsDif to Median
			MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	923	9.36175	5.056806	4.601354	
DEP	774	10.65830	5.646032	5.238998	
INR	61	2.83989	2.358812	2.014416	
OVR	4686	10.08974	4.814552	4.715546	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.7704	3	6440	0.5104
Brown-Forsythe	2.8275	3	6440	0.0371
Levene	3.8527	3	6440	0.0091
Bartlett	36.8738	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob>F	
34.2560	3	329.56	<.0001	

Figure A.1- 70 Statistical Tests for Lateral Error and Flight Type at Look Ahead 1800 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	923	1.08070	10.9588	0.3607
DEP	774	4.62673	16.2509	0.5841
INR	61	1.35041	9.6005	1.2292
OVR	4686	0.20939	9.7022	0.1417

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	ARR	OVR
DEP	0.00000	3.27632	3.54602	4.41734
INR	-3.27632	0.00000	0.26970	1.14102
ARR	-3.54602	-0.26970	0.00000	0.87132
OVR	-4.41734	-1.14102	-0.87132	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
$q^* = 2.56970$				
Abs(Dif)-LSD				
DEP	DEP			
DEP	-1.42034	INR	ARR	OVR
INR	-0.43952	-0.43952	-3.42416	-2.45973
ARR	2.18420	-3.42416	-1.30066	-0.13490
OVR	3.33323	-2.45973	-0.13490	-0.57725

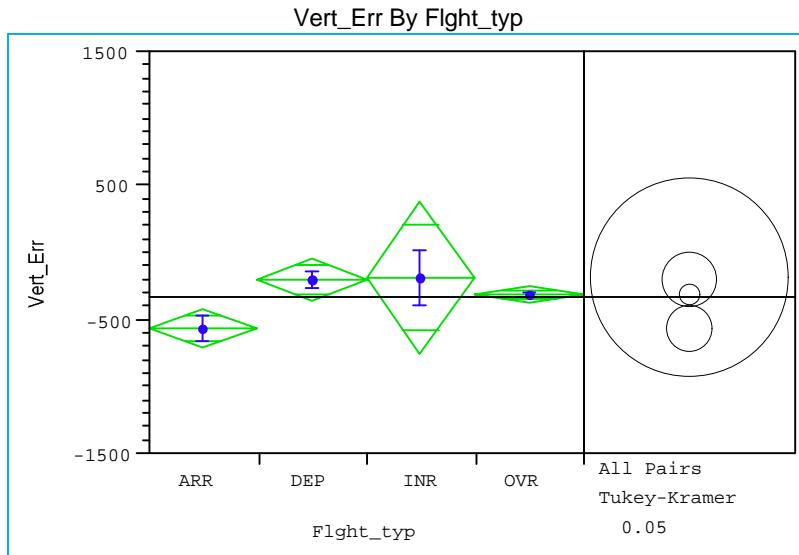
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
ARR	923	10.95884	7.66131	7.65645
DEP	774	16.25086	11.28068	11.26191
INR	61	9.60051	7.87813	7.78761
OVR	4686	9.70217	6.60987	6.60351

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	47.5172	3	6440	<.0001
Brown-Forsythe	77.6498	3	6440	<.0001
Levene	78.4720	3	6440	<.0001
Bartlett	148.7540	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	18.9311	3	272.99	<.0001

Figure A.1- 71 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	923	-554.826	3315.83	109.14
DEP	774	-193.895	1909.90	68.65
INR	61	-182.768	1606.16	205.65
OVR	4686	-306.194	2109.86	30.82

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.000	11.127	123.426	372.058
DEP	-11.127	0.000	112.299	360.931
OVR	-123.426	-112.299	0.000	248.632
ARR	-372.058	-360.931	-248.632	0.000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q^*	2.56970
Abs(Dif)-LSD	
INR	INR
DEP	DEP
OVR	OVR
ARR	ARR

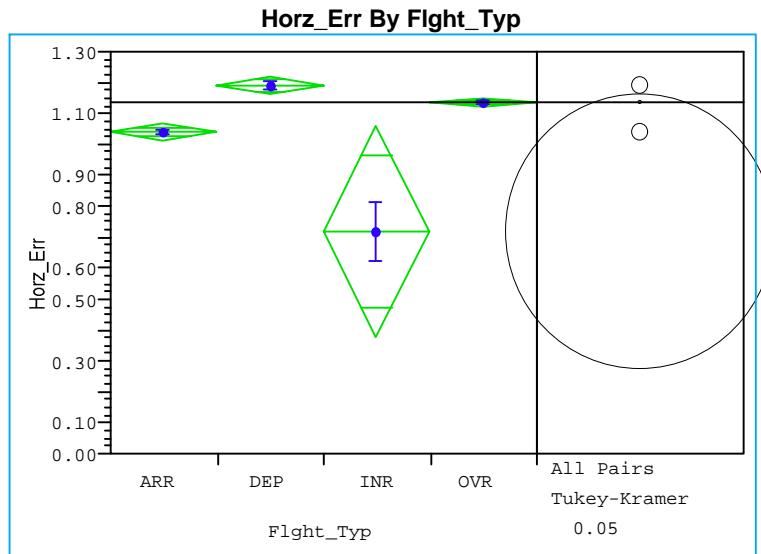
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	923	3315.832	2390.947	2384.889
DEP	774	1909.896	982.823	867.364
INR	61	1606.156	1124.436	1093.585
OVR	4686	2109.856	1060.170	882.069

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	14.8573	3	6440	<.0001
Brown-Forsythe	153.9664	3	6440	<.0001
Levene	135.4751	3	6440	<.0001
Bartlett	148.1365	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	2.7205	3	277.94	0.0448

Figure A.1- 72 Statistical Tests for Vertical Error and Flight Type at Look Ahead 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	4349	1.04608	0.779149	0.01181
DEP	3954	1.19398	0.951797	0.01514
INR	28	0.72009	0.526729	0.09954
OVR	17817	1.14703	0.975480	0.00731

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	ARR	INR
DEP	0.000000	0.046943	0.147892	0.473892
OVR	-0.04694	0.000000	0.100950	0.426949
ARR	-0.14789	-0.10095	0.000000	0.325999
INR	-0.47389	-0.42695	-0.326	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.56920$			
Abs(Dif)-LSD	DEP	OVR	ARR	INR
DEP	-0.05441	0.004414	0.094733	0.015082
OVR	0.004414	-0.02563	0.060032	-0.0306
ARR	0.094733	0.060032	-0.05188	-0.13266
INR	0.015082	-0.0306	-0.13266	-0.64657

Positive values show pairs of means that are significantly different.

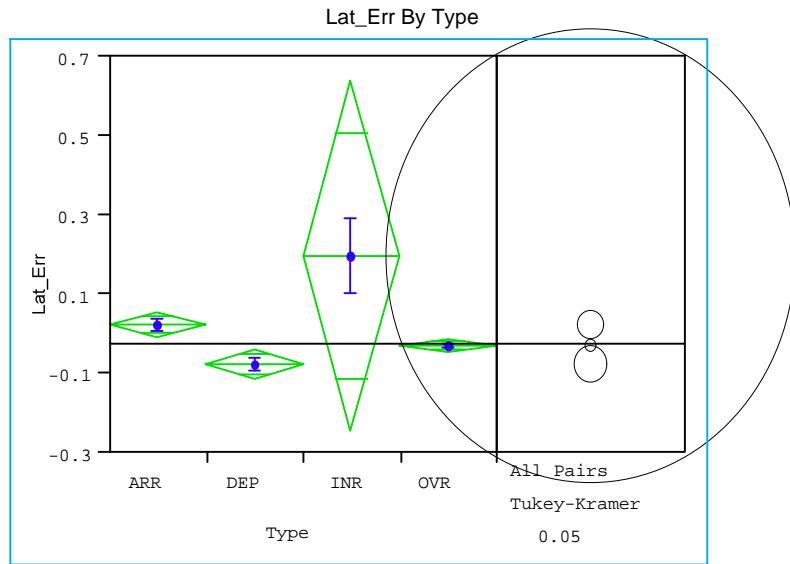
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	4349	0.7791494	0.6031522	0.5858818
DEP	3954	0.9517968	0.6777382	0.6582575
INR	28	0.5267289	0.4490194	0.4421643
OVR	17817	0.9754801	0.6561249	0.6345357

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.0137	3	26144	0.3853
Brown-Forsythe	8.1709	3	26144	<.0001
Levene	10.3530	3	26144	<.0001
Bartlett	111.3007	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
29.9164	3	134.7	<.0001

Figure A.1- 73 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	4349	0.023929	1.08964	0.01652
DEP	3954	-0.07542	1.20787	0.01921
INR	28	0.202157	0.52083	0.09843
OVR	17817	-0.02599	1.22300	0.00916

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	OVR	DEP
INR	0.000000	0.178228	0.228142	0.277578
ARR	-0.178223	0.000000	0.049914	0.099349
OVR	-0.22814	-0.04991	0.000000	0.049436
DEP	-0.27758	-0.09935	-0.04944	0.000000

Alpha=	0.05	Comparisons for all pairs using Tukey-Kramer HSD			
Abs(Dif)-LSD		INR	ARR	OVR	DEP
INR	-0.82329	-0.4058	-0.35447	-0.30663	
ARR	-0.4058	-0.06606	-0.00219	0.031660	
OVR	-0.35447	-0.00219	-0.03264	-0.00472	
DEP	-0.30663	0.031660	-0.00472	-0.06928	

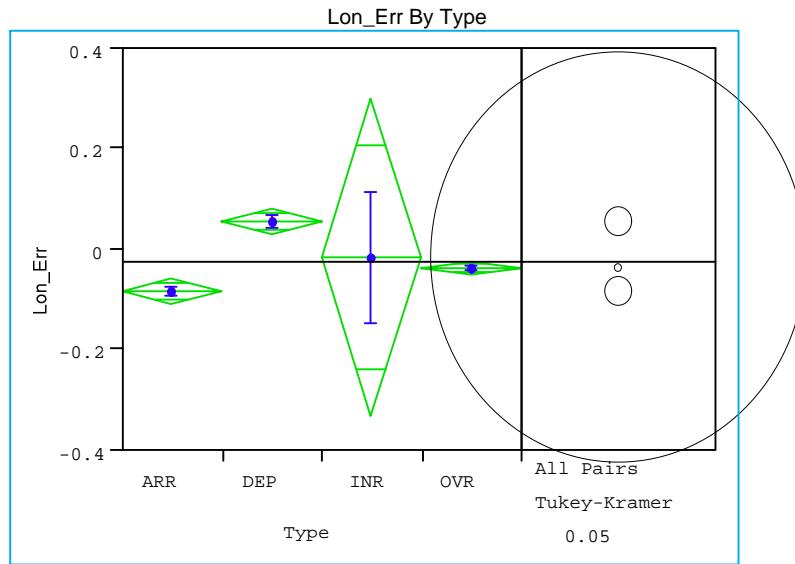
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	4349	1.089636	0.7363338	0.7355038
DEP	3954	1.207866	0.8603305	0.8572336
INR	28	0.520833	0.3176684	0.3121000
OVR	17817	1.222998	0.8094429	0.8089403

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.2692	3	26144	0.0783
Brown-Forsythe	16.3464	3	26144	<.0001
Levene	16.7351	3	26144	<.0001
Bartlett	37.3253	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	6.8777	3	135.28	0.0002

Figure A.1- 74 Statistical Tests for Lateral Error and Flight Type at Look Ahead 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	4349	-0.07945	0.712339	0.01080
DEP	3954	0.064564	0.929010	0.01477
INR	28	-0.00764	0.708145	0.13383
OVR	17817	-0.03093	0.877478	0.00657

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	OVR	ARR
DEP	0.000000	0.072203	0.095493	0.144011
INR	-0.0722	0.000000	0.023290	0.071808
OVR	-0.09549	-0.02329	0.000000	0.048519
ARR	-0.14401	-0.07181	-0.04852	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q* = 2.56920	
Abs(Dif)-LSD	
DEP	-0.04971
INR	-0.34697
OVR	0.056638
ARR	0.095444
DEP	-0.34697
INR	-0.59072
OVR	-0.39474
ARR	-0.34723

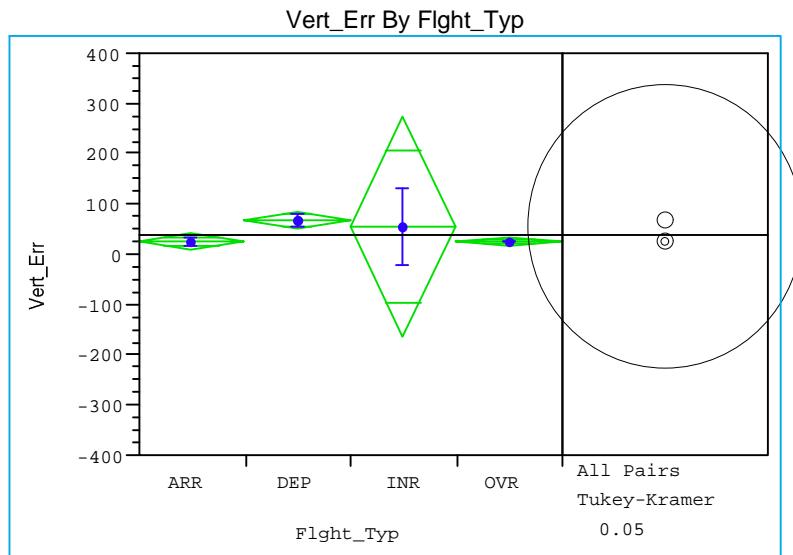
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	4349	0.7123388	0.5450016	0.5447454
DEP	3954	0.9290096	0.6044064	0.6039326
INR	28	0.7081455	0.5404064	0.5390250
OVR	17817	0.8774782	0.5987171	0.5985922

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.3048	3	26144	0.0747
Brown-Forsythe	9.4190	3	26144	<.0001
Levene	9.4162	3	26144	<.0001
Bartlett	112.6175	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	20.4530	3	134.2	<.0001

Figure A.1- 75 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	4349	33.5672	678.371	10.287
DEP	3954	73.3885	796.740	12.671
INR	28	65.9412	408.616	77.221
OVR	17817	32.3289	510.259	3.823

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	ARR	OVR
DEP	0.0000	7.4473	39.8213	41.0596
INR	-7.4473	0.0000	32.3741	33.6123
ARR	-39.8213	-32.3741	0.0000	1.2383
OVR	-41.0596	-33.6123	-1.2383	0.0000

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
$q^* = 2.56920$								
Abs(Dif)-LSD	DEP	INR	ARR	OVR				
DEP	-34.190	-280.860	6.417	14.335				
INR	-280.860	-406.292	-255.841	-253.905				
ARR	6.417	-255.841	-32.600	-24.474				
OVR	14.335	-253.905	-24.474	-16.106				

Positive values show pairs of means that are significantly different.

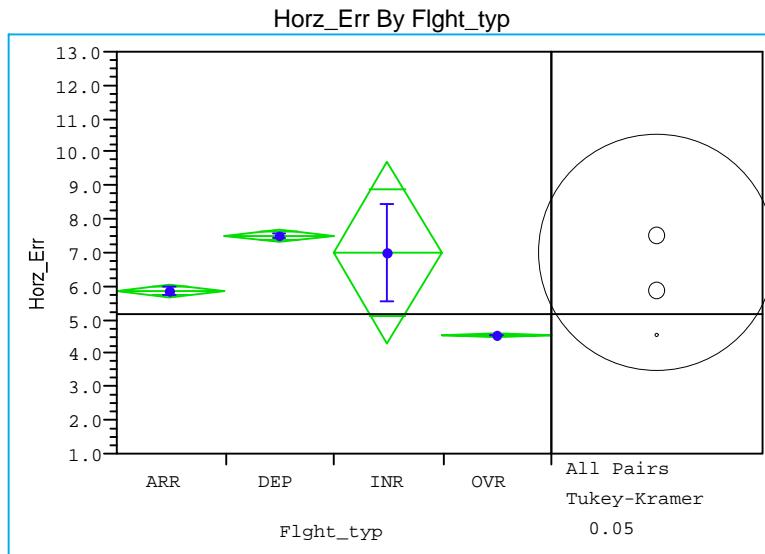
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	4349	678.3714	226.6330	210.8493
DEP	3954	796.7398	264.2650	232.0424
INR	28	408.6163	256.7743	226.6881
OVR	17817	510.2591	120.0023	97.5634

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.1109	3	26144	0.3432
Brown-Forsythe	88.3183	3	26144	<.0001
Levene	94.5199	3	26144	<.0001
Bartlett	582.8649	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
3.2411	3	134.08	0.0242

Figure A.1- 76 Statistical Tests for Vertical Error and Flight Type at Look Ahead 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2180	5.86620	6.69565	0.1434
DEP	3140	7.50980	6.31770	0.1127
INR	16	7.05297	6.02153	1.5054
OVR	12874	4.55009	5.17903	0.0456

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	ARR	OVR
DEP	0.00000	0.45684	1.64360	2.95971
INR	-0.45684	0.00000	1.18677	2.50287
ARR	-1.64360	-1.18677	0.00000	1.31610
OVR	-2.95971	-2.50287	-1.31610	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56927$	
Abs(Dif)-LSD	DEP
DEP	-0.36244
INR	-3.14254
ARR	1.24325
OVR	2.67388
Abs(Dif)-LSD	INR
DEP	-3.14254
INR	-5.07737
ARR	-2.41662
OVR	-1.08960
Abs(Dif)-LSD	ARR
DEP	1.24325
INR	-2.41662
ARR	-0.43498
OVR	0.98350
Abs(Dif)-LSD	OVR
DEP	2.67388
INR	-1.08960
ARR	0.98350
OVR	-0.17900

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

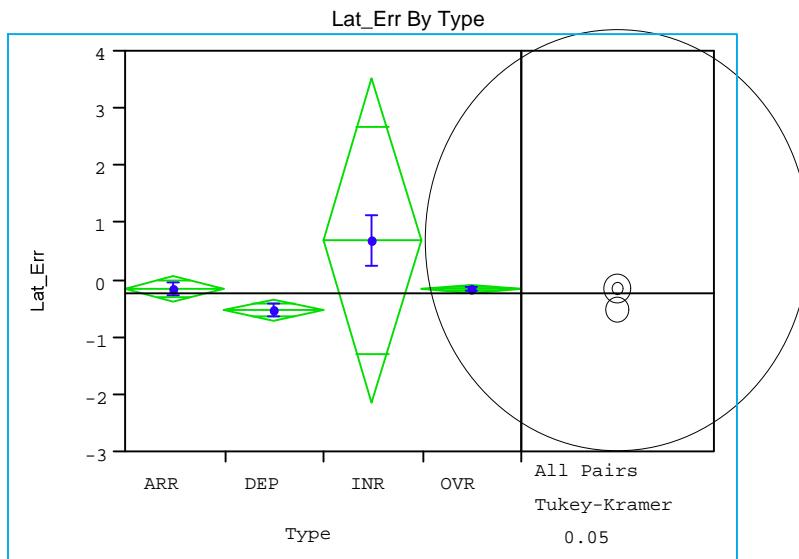
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2180	6.695652	4.365687	3.987987
DEP	3140	6.317700	4.868264	4.673344
INR	16	6.021531	5.056123	4.711769
OVR	12874	5.179030	3.279434	2.983894

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	7.2002	3	18206	<.0001
Brown-Forsythe	122.4661	3	18206	<.0001
Levene	146.0102	3	18206	<.0001
Bartlett	134.2650	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

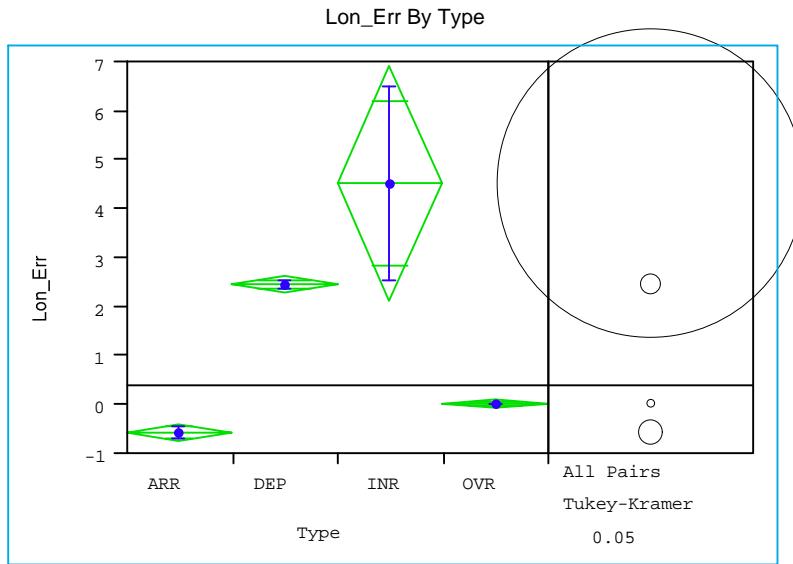
F Ratio	DF Num	DF Den	Prob>F
206.3231	3	74.401	<.0001

Figure A.1- 77 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2180	-0.16896	6.26443	0.13417
DEP	3140	-0.51797	6.36964	0.11367
INR	16	0.695931	1.85391	0.46348
OVR	12874	-0.17524	5.59431	0.04930
Means Comparisons				
Dif=Mean[i]-Mean[j]		INR	ARR	OVR
INR		0.00000	0.86490	0.87117
ARR		-0.86490	0.00000	0.00628
OVR		-0.87117	-0.00628	0.00000
DEP		-1.21390	-0.34900	-0.34273
DEP				0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 2.56927		
Abs(Dif)-LSD		INR	ARR	OVR
INR		-5.28294	-2.88439	-2.86675
ARR		-2.88439	-0.45259	-0.33979
OVR		-2.86675	-0.33979	-0.18624
DEP		-2.53121	-0.06756	0.04532
				-0.37711
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2180	6.264428	3.285577	3.271467
DEP	3140	6.369638	3.649050	3.564355
INR	16	1.853908	1.125722	0.959294
OVR	12874	5.594305	2.920873	2.901661
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		4.3455	3	18206
Brown-Forsythe		17.5723	3	18206
Levene		20.5875	3	18206
Bartlett		46.0556	3	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	3.8437	3	75.584	0.0128

Figure A.1- 78 Statistical Tests for Lateral Error and Flight Type at Look Ahead 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	2180	-0.54771	6.29985	0.1349
DEP	3140	2.49767	7.01765	0.1252
INR	16	4.58689	7.93243	1.9831
OVR	12874	0.04333	4.02473	0.0355

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00000	2.08922	4.54357	5.13460
DEP	-2.08922	0.00000	2.45435	3.04538
OVR	-4.54357	-2.45435	0.00000	0.59103
ARR	-5.13460	-3.04538	-0.59103	0.00000

Alpha=	0.05	Comparisons for all pairs using Tukey-Kramer HSD			
Abs(Dif)-LSD		INR	DEP	OVR	ARR
INR	-4.51878	-1.11417	1.34632	1.92764	
DEP	-1.11417	-0.32256	2.19996	2.68907	
OVR	1.34632	2.19996	-0.15930	0.29502	
ARR	1.92764	2.68907	0.29502	-0.38713	

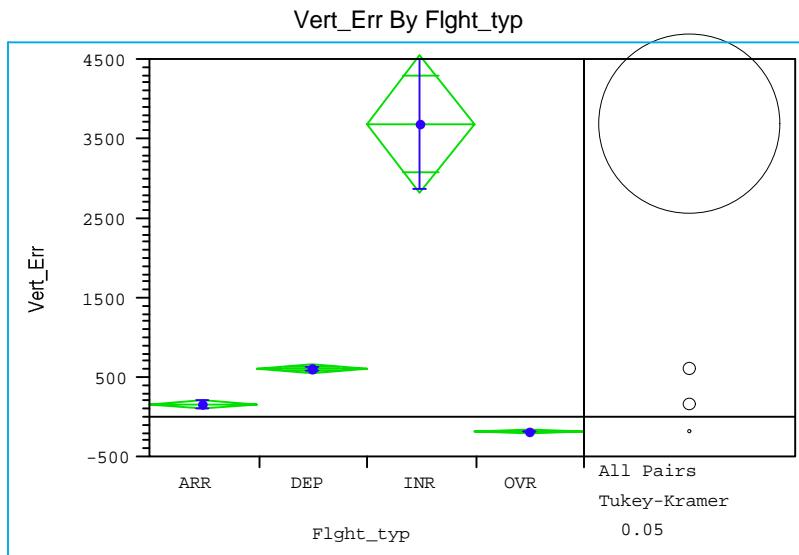
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	2180	6.299850	3.924904	3.888910
DEP	3140	7.017651	5.348000	5.294645
INR	16	7.932428	6.865618	6.553169
OVR	12874	4.024735	2.592419	2.592157

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	60.2987	3	18206	<.0001
Brown-Forsythe	487.4840	3	18206	<.0001
Levene	520.7569	3	18206	0.0000
Bartlett	744.9788	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	128.1541	3	74.281	<.0001

Figure A.1- 79 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	2180	175.38	2729.41	58.46	
DEP	3140	627.24	2684.06	47.90	
INR	16	3707.17	3264.89	816.22	
OVR	12874	-168.77	1227.70	10.82	

Means Comparisons					
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR	
INR	0.00	3079.93	3531.79	3875.94	
DEP	-3079.93	0.00	451.86	796.01	
ARR	-3531.79	-451.86	0.00	344.15	
OVR	-3875.94	-796.01	-344.15	0.00	

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
q* = 2.56927								
Abs(Dif)-LSD	INR	DEP	ARR	OVR				
INR	-1627.04	1926.51	2377.09	2724.73				
DEP	1926.51	-116.14	323.57	704.42				
ARR	2377.09	323.57	-139.39	237.57				
OVR	2724.73	704.42	237.57	-57.36				

Positive values show pairs of means that are significantly different.

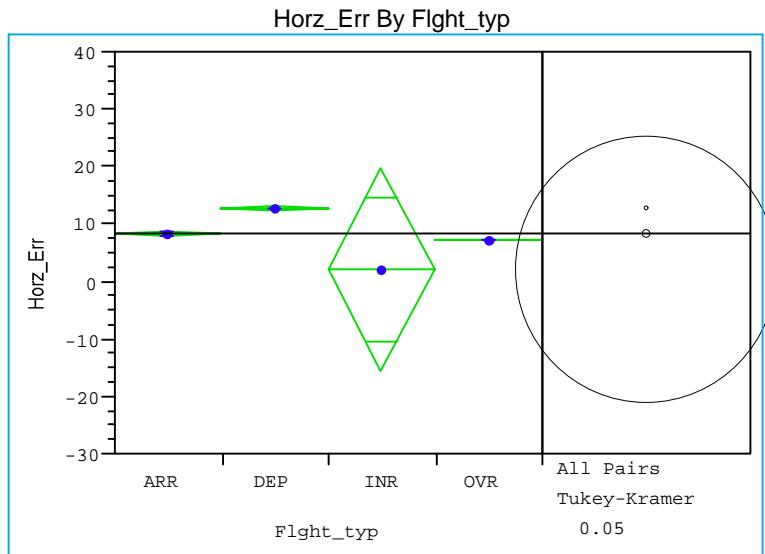
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	2180	2729.411	1761.558	1703.610	
DEP	3140	2684.064	1748.244	1525.927	
INR	16	3264.890	2778.220	2778.220	
OVR	12874	1227.696	543.385	426.297	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	230.5318	3	18206	<.0001
Brown-Forsythe	728.5862	3	18206	0.0000
Levene	886.8506	3	18206	0.0000
Bartlett	1764.0818	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
101.9032	3	74.222	<.0001

Figure A.1- 80 Statistical Tests for Vertical Error and Flight Type at Look Ahead 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	729	8.7146	10.0791	0.37330
DEP	1365	13.4251	11.2510	0.30452
INR	1	2.4478	?	?
OVR	8279	7.6036	8.6140	0.09467

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.0000	4.7105	5.8215	10.9773
ARR	-4.7105	0.0000	1.1110	6.2668
OVR	-5.8215	-1.1110	0.0000	5.1558
INR	-10.9773	-6.2668	-5.1558	0.0000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56945$	
Abs(Dif)-LSD	DEP
DEP	-0.8961
ARR	3.6366
OVR	5.1376
INR	-12.4419
	ARR
DEP	3.6366
ARR	-1.2262
OVR	0.2066
INR	-17.1599
	OVR
DEP	5.1376
ARR	-0.3639
OVR	-18.2563
INR	-18.2563
	INR
DEP	-12.4419
ARR	-17.1599
OVR	-18.2563
INR	-33.1077

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	729	10.07914	6.567019	6.022739
DEP	1365	11.25095	8.540999	8.215322
INR	1	?	0.000000	0.000000
OVR	8279	8.61395	5.298427	4.889349

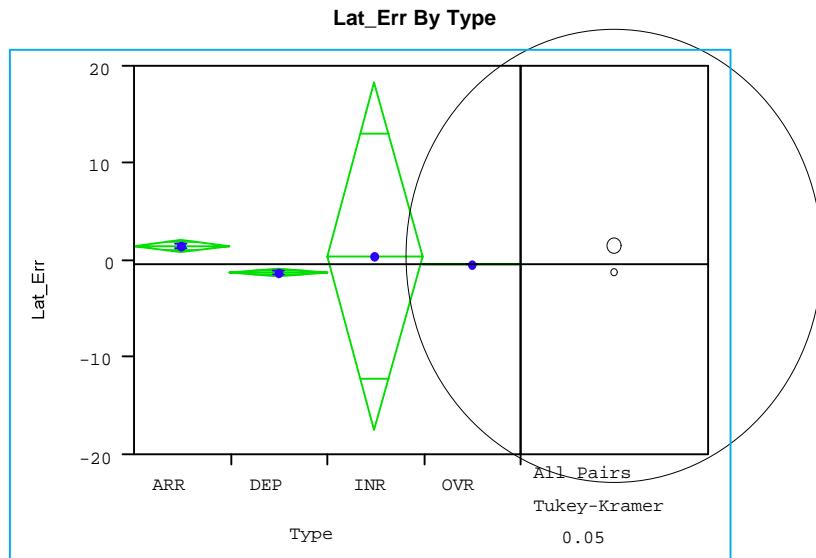
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	5.2489	2	10370	0.0053
Brown-Forsythe	112.7594	2	10370	<.0001
Levene	133.0604	2	10370	<.0001
Bartlett	103.2482	2	?	<.0001

Warning: Small sample sizes. Use Caution.

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
167.7543	2	1446	<.0001

Figure A.1- 81 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 1200 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	729	1.56100	8.4561	0.31319
DEP	1365	-1.20794	11.3769	0.30793
INR	1	0.44280	?	?
OVR	8279	-0.27068	8.8052	0.09677

Means Comparisons				
Dif=Mean[i]-Mean[j]	ARR	INR	OVR	DEP
ARR	0.00000	1.11820	1.83168	2.76894
INR	-1.11820	0.00000	0.71348	1.65074
OVR	-1.83168	-0.71348	0.00000	0.93726
DEP	-2.76894	-1.65074	-0.93726	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56945$	
Abs(Dif)-LSD	
AARR	-1.2330
INR	-22.4383
OVR	0.9222
DEP	1.6891
ARR	-22.4383
INR	-33.2911
OVR	-22.8283
DEP	-21.8982
ARR	0.9222
INR	-0.3659
OVR	0.2496
DEP	-0.9011

Positive values show pairs of means that are significantly different.

Level	Count	Std Dev	Tests that the Variances are Equal		MeanAbsDif to Median
			MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	729	8.45614	4.767762	4.416341	
DEP	1365	11.37686	6.363812	6.059668	
INR	1	?	0.000000	0.000000	
OVR	8279	8.80522	4.409537	4.367785	

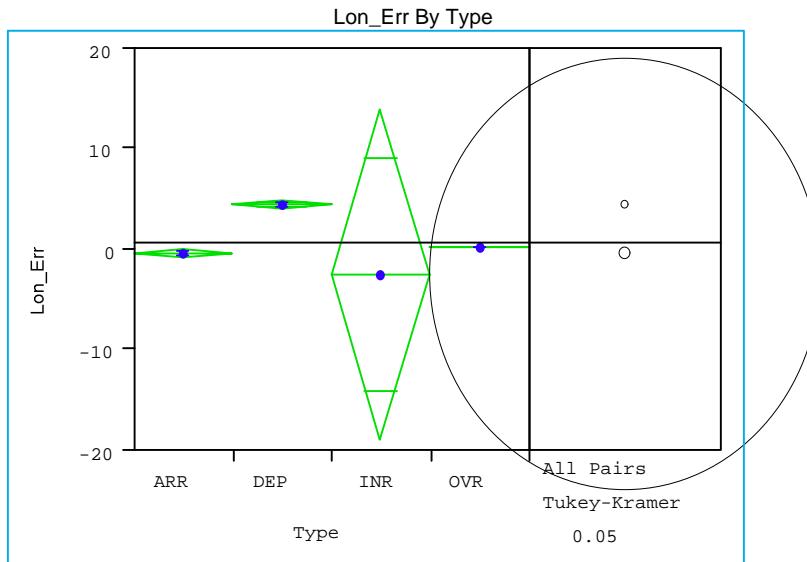
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	7.8126	2	10370	0.0004
Brown-Forsythe	26.8696	2	10370	<.0001
Levene	36.4313	2	10370	<.0001
Bartlett	91.3932	2	?	<.0001

Warning: Small sample sizes. Use Caution.

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
21.4219	2	1495.7	<.0001

Figure A.1- 82 Statistical Tests for Lateral Error and Flight Type at Look Ahead 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	729	-0.38947	10.1754	0.37687
DEP	1365	4.47971	12.4889	0.33803
INR	1	-2.40740	?	?
OVR	8279	0.29626	7.3708	0.08101

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	ARR	INR
DEP	0.00000	4.18344	4.86918	6.88711
OVR	-4.18344	0.00000	0.68573	2.70366
ARR	-4.86918	-0.68573	0.00000	2.01793
INR	-6.88711	-2.70366	-2.01793	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q* = 2.56945	
Abs(Dif)-LSD	
DEP	-0.8296
OVR	3.5503
ARR	3.8749
INR	-14.7947
DEP	3.5503
OVR	-0.3369
ARR	-0.1516
INR	-18.9715
DEP	3.8749
OVR	-0.1516
ARR	-1.1352
INR	-19.6708
DEP	-14.7947
OVR	-18.9715
ARR	-19.6708
INR	-30.6515

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	729	10.17541	6.081124	6.059737
DEP	1365	12.48892	9.400217	9.368357
INR	1	?	0.000000	0.000000
OVR	8279	7.37080	4.808462	4.808404

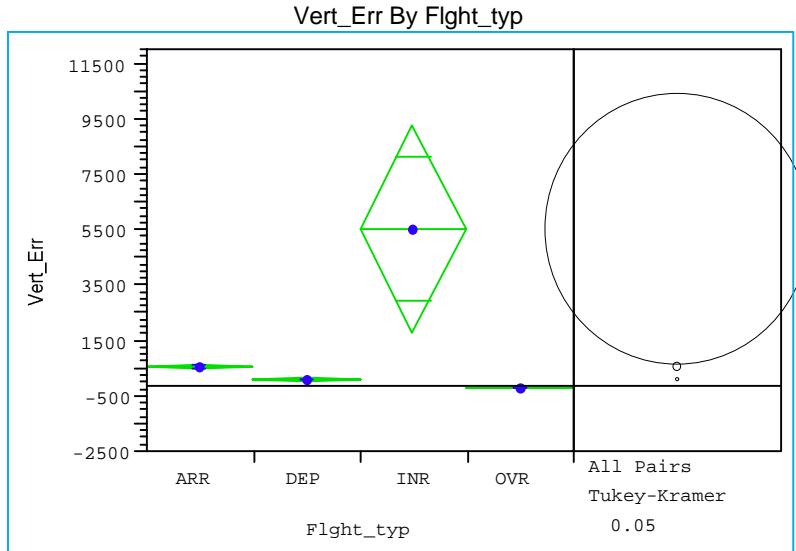
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	57.1117	2	10370	<.0001
Brown-Forsythe	317.8020	2	10370	<.0001
Levene	324.5898	2	10370	<.0001
Bartlett	444.6502	2	?	<.0001

Warning: Small sample sizes. Use Caution.

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
75.1969	2	1388.2	<.0001

Figure A.1- 83 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	729	579.37	3291.49	121.91
DEP	1365	104.24	2134.86	57.78
INR	1	5507.95	?	?
OVR	8279	-198.02	1698.40	18.67

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	DEP	OVR
INR	0.00	4928.58	5403.71	5705.97
ARR	-4928.58	0.00	475.12	777.39
DEP	-5403.71	-475.12	0.00	302.26
OVR	-5705.97	-777.39	-302.26	0.00

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
$q^* = 2.56945$								
Abs(Dif)-LSD	INR	ARR	DEP	OVR				
INR	-6954.32	7.76	484.46	788.23				
ARR	7.76	-257.57	249.54	587.41				
DEP	484.46	249.54	-188.23	158.61				
OVR	788.23	587.41	158.61	-76.43				

Positive values show pairs of means that are significantly different.

Level	Count	Std Dev	Tests that the Variances are Equal		MeanAbsDif to Median
			MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	729	3291.494	2276.198		2138.758
DEP	1365	2134.857	1136.639		1086.583
INR	1	?	0.000		0.000
OVR	8279	1698.399	733.179		605.093

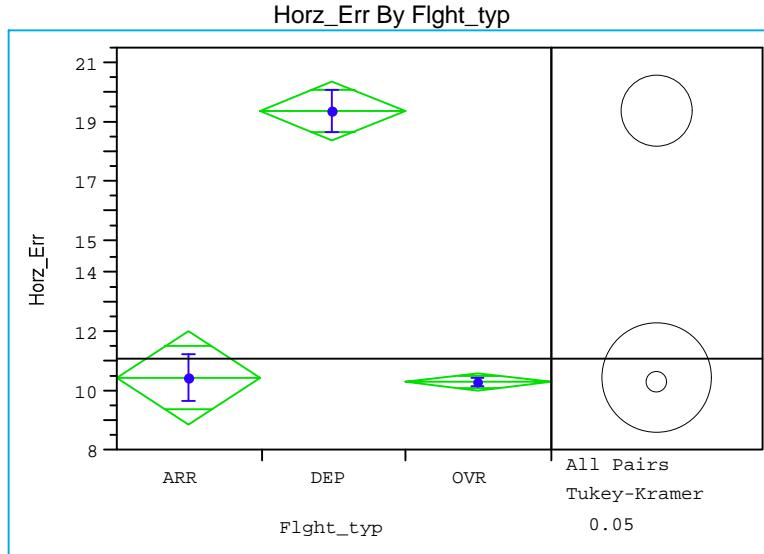
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	29.8563	2	10370	<.0001
Brown-Forsythe	292.7935	2	10370	<.0001
Levene	312.5342	2	10370	<.0001
Bartlett	444.4994	2	?	<.0001

Warning: Small sample sizes. Use Caution.

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
30.8476	2	1387.2	<.0001

Figure A.1- 84 Statistical Tests for Vertical Error and Flight Type at Look Ahead 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	192	9.8864	11.3504	0.81914
DEP	453	18.8873	15.5140	0.72891
OVR	4246	9.7690	10.6856	0.16399

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	
DEP	0.00000	9.00087	9.11827	
ARR	-9.00087	0.00000	0.11739	
OVR	-9.11827	-0.11739	0.00000	

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q* = 2.34442	
Abs(Dif)-LSD	DEP
DEP	-1.75171
ARR	6.73060
OVR	7.81522
DEP	6.73060
ARR	-2.69068
OVR	-1.82775
DEP	7.81522
ARR	-1.82775
OVR	-0.57217

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

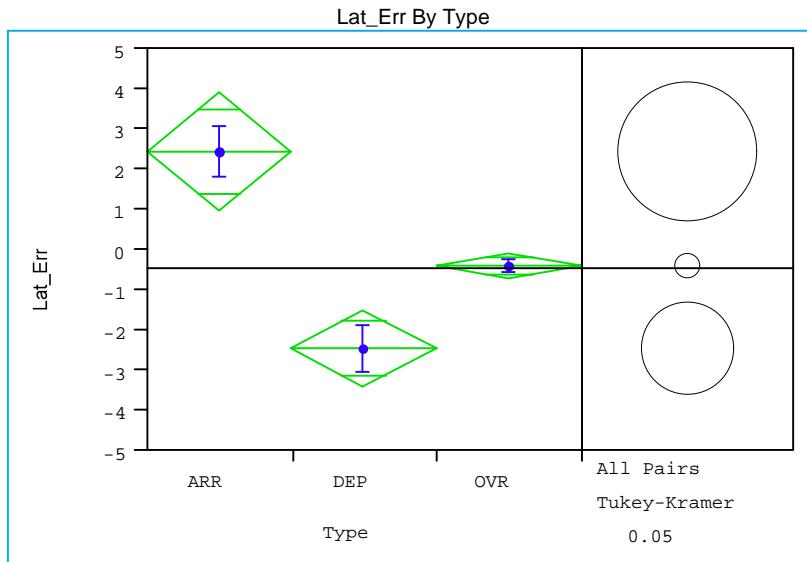
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	192	11.35035	7.21880	6.58526
DEP	453	15.51400	11.54072	11.16352
OVR	4246	10.68558	6.58978	6.13299

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	6.9458	2	4888	0.0010
Brown-Forsythe	58.2217	2	4888	<.0001
Levene	67.5119	2	4888	<.0001
Bartlett	69.3221	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

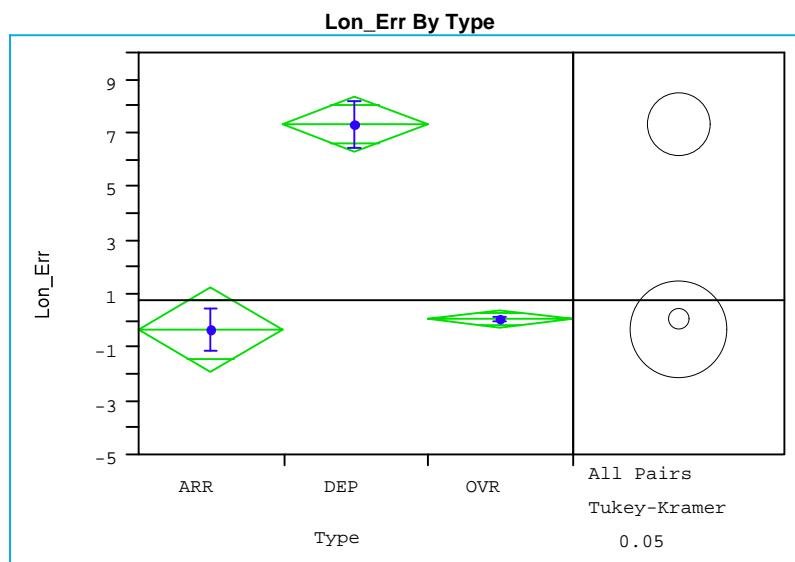
F Ratio	DF Num	DF Den	Prob>F
74.4201	2	388.08	<.0001

Figure A.1- 85 Statistical Tests for Horizontal Error and Flight Type at Look Ahead 1800 for Samples at Altitudes Above 18,000 Feet



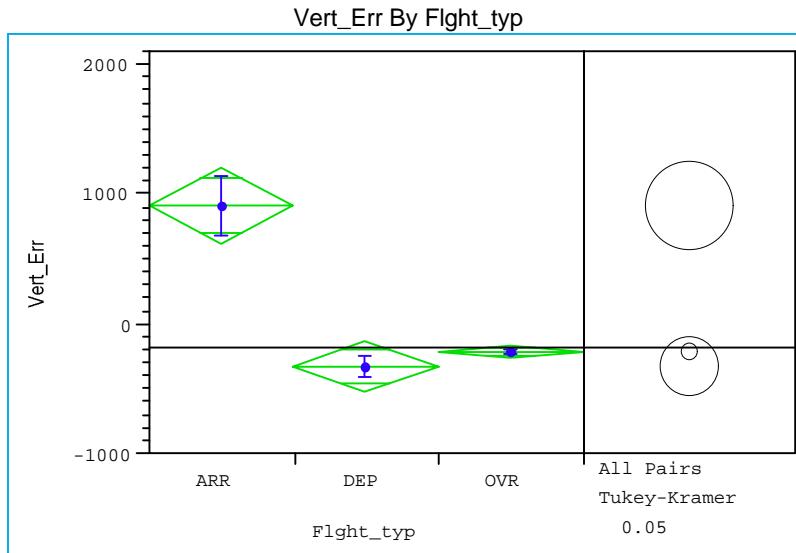
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	192	2.45824	9.2059	0.66438
DEP	453	-2.41967	13.2625	0.62313
OVR	4246	-0.36431	10.4774	0.16079
Means Comparisons				
Dif=Mean[i]-Mean[j]		ARR	OVR	DEP
ARR		0.00000	2.82254	4.87791
OVR		-2.82254	0.00000	2.05537
DEP		-4.87791	-2.05537	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 2.34442$		
Abs(Dif)-LSD		ARR	OVR	DEP
ARR		-2.56497	0.96828	2.71371
OVR		0.96828	-0.54543	0.81320
DEP		2.71371	0.81320	-1.66987
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	192	9.20588	5.485769	4.839015
DEP	453	13.26254	7.757803	7.047101
OVR	4246	10.47740	4.954473	4.880312
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.2232	2	4888	0.1084
Brown-Forsythe	10.7965	2	4888	<.0001
Levene	18.5959	2	4888	<.0001
Bartlett	29.8818	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	14.4264	2	400.05	<.0001

Figure A.1- 86 Statistical Tests for Lateral Error and Flight Type at Look Ahead 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	192	-0.28145	11.6697	0.84218	
DEP	453	7.35761	19.0312	0.89416	
OVR	4246	0.12236	9.9857	0.15325	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DEP	OVR	ARR	
DEP		0.00000	7.23525	7.63906	
OVR		-7.23525	0.00000	0.40382	
ARR		-7.63906	-0.40382	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34442$				
Abs(Dif)-LSD		DEP	OVR	ARR	
DEP		-1.74448	5.93757	5.37816	
OVR		5.93757	-0.56980	-1.53329	
ARR		5.37816	-1.53329	-2.67957	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	192	11.66965	6.81430	6.80113	
DEP	453	19.03118	13.86243	13.85707	
OVR	4246	9.98569	6.81711	6.81249	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		86.6965	2	4888	<.0001
Brown-Forsythe		155.5814	2	4888	<.0001
Levene		155.9712	2	4888	<.0001
Bartlett		238.7980	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	32.0015	2	380.57	<.0001	

Figure A.1- 87 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	192	915.073	3306.58	238.63
DEP	453	-325.001	2054.36	96.52
OVR	4246	-214.247	2071.27	31.79

Means Comparisons			
Dif=Mean[i]-Mean[j]	ARR	OVR	DEP
ARR	0.00	1129.32	1240.07
OVR	-1129.32	0.00	110.75
DEP	-1240.07	-110.75	0.00

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD

	q*	2.34442
Abs(Dif)-LSD		
ARR	ARR	0.00
ARR	OVR	1129.32
OVR	ARR	-1129.32
OVR	OVR	0.00
DEP	ARR	-1240.07
DEP	OVR	-110.75
DEP	DEP	0.00

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	192	3306.584	2495.533	2281.024
DEP	453	2054.355	1156.018	964.542
OVR	4246	2071.266	952.880	823.117

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.2822	2	4888	0.0139
Brown-Forsythe	52.4411	2	4888	<.0001
Levene	65.6802	2	4888	<.0001
Bartlett	54.4102	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
11.8078	2	387.5	<.0001

Figure A.1- 88 Statistical Tests for Vertical Error and Flight Type at Look Ahead 1800 for Samples at Altitudes Above 18,000 Feet

A.1.3 Horizontal Phase of Flight per Look Ahead Time

A.1.3.1 Summary Tables

Look Ahead Time	0		300	
	Straight	Turn	Straight	Turn
Horizontal Phase of Flight	30644	5284	25710	4089
Sample Quantity	30644	5284	25710	4089
Avg. Horz. Error	1.19	1.29	3.16	3.17
Stddev. Horz. Error	1.05	1.27	3.38	3.53
Max. Horz. Error	42.39	16.91	84.31	65.56
Min. Horz. Error	0	0	0.01	0.03
Avg. Lat. Error	-0.02	-0.03	-0.11	-0.02
Stddev. Lat. Error	1.31	1.54	3.65	3.6
Max. Lat. Error	32.23	13.48	65.49	24.97
Min. Lat. Error	-12.79	-16	-39.47	-36.73
Avg. Abs. Lat. Error	0.86	0.96	1.98	1.98
Stddev. Abs. Lat. Error	0.99	1.2	3.07	3
Max. Abs. Lat. Error	32.23	16	65.49	36.73
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.01	-0.06	0.12	-0.11
Stddev. Long. Error	0.9	0.95	2.84	3.09
Max. Long. Error	11.93	9.33	25.52	22.3
Min. Long. Error	-27.53	-9.81	-63.13	-65.39
Avg. Abs. Long. Error	0.6	0.64	1.87	1.92
Stddev. Abs. Long. Error	0.67	0.71	2.13	2.41
Max. Abs. Long. Error	27.53	9.81	63.13	65.39
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	47.19	61.93	-5.09	-18.64
Stddev. Vert. Error	649.95	733.67	1611.37	1623.68
Max. Vert. Error	36817	21071.71	34817	9649
Min. Vert. Error	-6824.15	-4734	-12626.9	-12244.5
Avg. Abs. Vert. Error	193.1	268.05	726.83	788.28
Stddev. Abs. Vert. Error	622.39	685.74	1438.14	1419.56
Max. Abs. Vert. Error	36817	21071.71	34817	12244.45
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	1.19	1.3	3.18	3.18
Stddev. Slant Range Error	1.05	1.27	3.37	3.52
Max. Slant Range Error	42.39	16.91	84.34	65.56
Min. Slant Range Error	0	0	0.01	0.04

Figure A.1- 89 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	600		900	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	20696	3268	15904	2625
Avg. Horz. Error	5.16	4.81	6.88	6.48
Stddev. Horz. Error	5.49	5.3	7.32	7.05
Max. Horz. Error	125.68	92.46	167.79	150.3
Min. Horz. Error	0.02	0.03	0.02	0.05
Avg. Lat. Error	-0.19	-0.05	-0.23	-0.15
Stddev. Lat. Error	5.49	5.05	7.07	6.42
Max. Lat. Error	97.45	71.88	129.48	115.83
Min. Lat. Error	-61.74	-53.06	-94.55	-59.15
Avg. Abs. Lat. Error	2.9	2.61	3.66	3.19
Stddev. Abs. Lat. Error	4.66	4.32	6.05	5.57
Max. Abs. Lat. Error	97.45	71.88	129.48	115.83
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.44	-0.14	0.59	0.11
Stddev. Long. Error	5.13	5.06	7.11	7.1
Max. Long. Error	91.73	67.54	94.25	41.71
Min. Long. Error	-79.36	-58.15	-106.71	-95.77
Avg. Abs. Long. Error	3.31	3.27	4.59	4.64
Stddev. Abs. Long. Error	3.95	3.87	5.45	5.37
Max. Abs. Long. Error	91.73	67.54	106.71	95.77
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-118	-180.93	-180.03	-204.44
Stddev. Vert. Error	1956.29	1989.43	2003.17	2027.8
Max. Vert. Error	28933	14957.77	30746.5	25785.61
Min. Vert. Error	-15373.8	-12081.6	-16419.3	-14157.8
Avg. Abs. Vert. Error	908.33	978.49	932.57	1025.48
Stddev. Abs. Vert. Error	1736.63	1741.51	1781.95	1761.19
Max. Abs. Vert. Error	28933	14957.77	30746.5	25785.61
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	5.17	4.82	6.89	6.5
Stddev. Slant Range Error	5.49	5.29	7.31	7.04
Max. Slant Range Error	125.72	92.49	167.86	150.36
Min. Slant Range Error	0.02	0.03	0.03	0.05

Figure A.1- 90 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1200		1500	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	11777	2059	8172	1506
Avg. Horz. Error	8.36	7.62	9.47	8.78
Stddev. Horz. Error	9.08	7.68	10.29	8.93
Max. Horz. Error	173.62	59.78	156.35	75.02
Min. Horz. Error	0.02	0.05	0.01	0.09
Avg. Lat. Error	-0.19	-0.35	-0.25	-0.2
Stddev. Lat. Error	8.7	6.49	9.8	7.6
Max. Lat. Error	134.87	37.52	120.34	43.04
Min. Lat. Error	-124.94	-58.31	-143.49	-74.28
Avg. Abs. Lat. Error	4.31	3.31	4.74	3.69
Stddev. Abs. Lat. Error	7.56	5.59	8.58	6.64
Max. Abs. Lat. Error	134.87	58.31	143.49	74.28
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.78	0.23	0.91	0.15
Stddev. Long. Error	8.71	8.65	9.93	9.95
Max. Long. Error	96.16	52.72	97.63	57.59
Min. Long. Error	-109.33	-58.39	-99.82	-56.73
Avg. Abs. Long. Error	5.71	5.82	6.61	6.79
Stddev. Abs. Long. Error	6.63	6.41	7.46	7.27
Max. Abs. Long. Error	109.33	58.39	99.82	57.59
Min. Abs. Long. Error	0	0.01	0	0
Avg. Vert. Error	-211.73	-137.64	-273.57	-273.83
Stddev. Vert. Error	2118.95	2082.79	2206.29	2285.65
Max. Vert. Error	37473.73	22311.16	38907.87	13328.09
Min. Vert. Error	-15900	-11900	-15900	-17219.3
Avg. Abs. Vert. Error	974.42	1079.43	1034.06	1237.03
Stddev. Abs. Vert. Error	1893.47	1786.4	1968.04	1941.13
Max. Abs. Vert. Error	37473.73	22311.16	38907.87	17219.3
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	8.37	7.63	9.48	8.79
Stddev. Slant Range Error	9.07	7.68	10.29	8.92
Max. Slant Range Error	173.7	59.78	156.48	75.02
Min. Slant Range Error	0.02	0.05	0.01	0.12

Figure A.1- 91 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1800	
Horizontal Phase of Flight	Straight	Turn
Sample Quantity	5374	1070
Avg. Horz. Error	10.36	9.2
Stddev. Horz. Error	11.13	9.6
Max. Horz. Error	169.84	112.98
Min. Horz. Error	0.04	0.22
Avg. Lat. Error	-0.25	-0.08
Stddev. Lat. Error	10.33	8.55
Max. Lat. Error	117.09	53.32
Min. Lat. Error	-155.99	-91.1
Avg. Abs. Lat. Error	4.97	3.63
Stddev. Abs. Lat. Error	9.06	7.74
Max. Abs. Lat. Error	155.99	91.1
Min. Abs. Lat. Error	0	0
Avg. Long. Error	1.03	0.12
Stddev. Long. Error	11.11	10.19
Max. Long. Error	98.01	41.35
Min. Long. Error	-78.53	-66.82
Avg. Abs. Long. Error	7.46	7.23
Stddev. Abs. Long. Error	8.29	7.18
Max. Abs. Long. Error	98.01	66.82
Min. Abs. Long. Error	0	0.01
Avg. Vert. Error	-353.57	-194.44
Stddev. Vert. Error	2288.19	2344.76
Max. Vert. Error	31668.16	23241.93
Min. Vert. Error	-15800	-10068.2
Avg. Abs. Vert. Error	1079.65	1199.17
Stddev. Abs. Vert. Error	2048.16	2023.96
Max. Abs. Vert. Error	31668.16	23241.93
Min. Abs. Vert. Error	0	0
Avg. Slant Range Error	10.37	9.21
Stddev. Slant Range Error	11.12	9.6
Max. Slant Range Error	169.84	112.98
Min. Slant Range Error	0.04	0.23

Figure A.1- 92 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	0		300	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	23358	2790	20257	2243
Avg. Horz. Error	1.14	1.12	3.17	3.25
Stddev. Horz. Error	0.96	0.81	3.51	3.8
Max. Horz. Error	42.39	8.85	84.31	65.56
Min. Horz. Error	0	0	0.01	0.03
Avg. Lat. Error	-0.03	-0.02	-0.12	-0.11
Stddev. Lat. Error	1.21	1.15	3.79	3.91
Max. Lat. Error	32.23	7.19	65.49	24.97
Min. Lat. Error	-6.04	-4.23	-39.47	-36.73
Avg. Abs. Lat. Error	0.8	0.8	2.02	2.07
Stddev. Abs. Lat. Error	0.9	0.82	3.21	3.32
Max. Abs. Lat. Error	32.23	7.19	65.49	36.73
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.02	-0.05	0.14	-0.03
Stddev. Long. Error	0.87	0.78	2.83	3.12
Max. Long. Error	11.93	8.82	25.52	22.3
Min. Long. Error	-27.53	-4.14	-63.13	-65.39
Avg. Abs. Long. Error	0.59	0.6	1.84	1.9
Stddev. Abs. Long. Error	0.64	0.5	2.16	2.48
Max. Abs. Long. Error	27.53	8.82	63.13	65.39
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	38.33	42.51	51.55	132.07
Stddev. Vert. Error	591.23	597.13	1466.04	1342.85
Max. Vert. Error	36817	21071.71	34817	9649
Min. Vert. Error	-1838.97	-2800	-10304.6	-6590
Avg. Abs. Vert. Error	135.31	150.04	598.37	582.81
Stddev. Abs. Vert. Error	576.81	579.53	1339.36	1216.91
Max. Abs. Vert. Error	36817	21071.71	34817	9649
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	1.14	1.12	3.19	3.26
Stddev. Slant Range Error	0.96	0.82	3.51	3.8
Max. Slant Range Error	42.39	8.85	84.34	65.56
Min. Slant Range Error	0	0	0.01	0.04

Figure A.1- 93 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	600		900	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	16318	1892	12490	1482
Avg. Horz. Error	5.24	5.06	7.02	6.72
Stddev. Horz. Error	5.7	5.75	7.64	7.69
Max. Horz. Error	125.68	92.46	167.79	150.3
Min. Horz. Error	0.02	0.03	0.03	0.06
Avg. Lat. Error	-0.26	0	-0.26	-0.46
Stddev. Lat. Error	5.82	5.78	7.61	7.37
Max. Lat. Error	97.45	71.88	129.48	115.83
Min. Lat. Error	-61.74	-53.06	-94.55	-59.15
Avg. Abs. Lat. Error	3.08	2.89	3.95	3.58
Stddev. Abs. Lat. Error	4.95	5	6.5	6.46
Max. Abs. Lat. Error	97.45	71.88	129.48	115.83
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.46	-0.09	0.57	0.34
Stddev. Long. Error	5.07	5.03	7.03	7.04
Max. Long. Error	91.73	25.18	94.25	27.07
Min. Long. Error	-79.36	-58.15	-106.71	-95.77
Avg. Abs. Long. Error	3.24	3.32	4.49	4.53
Stddev. Abs. Long. Error	3.93	3.77	5.45	5.4
Max. Abs. Long. Error	91.73	58.15	106.71	95.77
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	10.08	39.12	-49.65	15.95
Stddev. Vert. Error	1820.98	1808.85	1853.61	1840.69
Max. Vert. Error	28933	14957.77	30746.5	25785.61
Min. Vert. Error	-10552	-9300	-10700	-8585.77
Avg. Abs. Vert. Error	771.03	779.41	779.51	775.96
Stddev. Abs. Vert. Error	1649.71	1632.69	1682.45	1669.09
Max. Abs. Vert. Error	28933	14957.77	30746.5	25785.61
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	5.25	5.07	7.03	6.73
Stddev. Slant Range Error	5.69	5.75	7.64	7.69
Max. Slant Range Error	125.72	92.49	167.86	150.36
Min. Slant Range Error	0.02	0.03	0.03	0.06

Figure A.1- 94 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

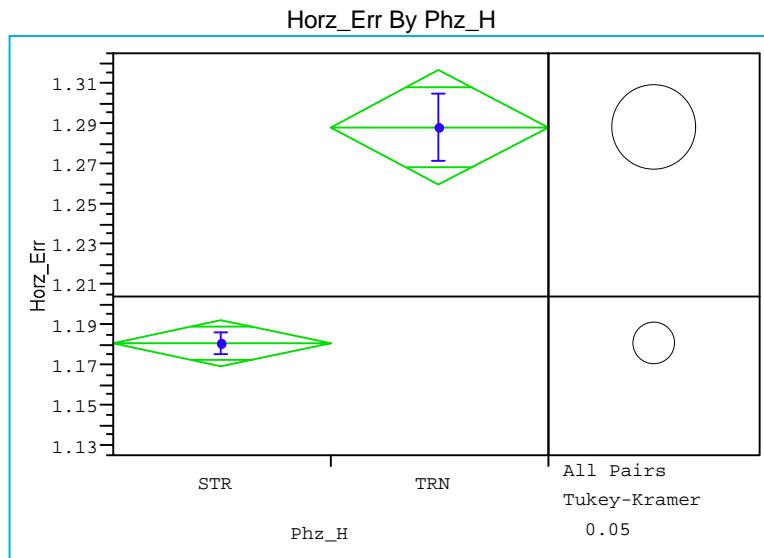
Look Ahead Time	1200		1500	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	9175	1199	6431	876
Avg. Horz. Error	8.54	7.77	9.75	8.85
Stddev. Horz. Error	9.51	7.65	10.83	8.97
Max. Horz. Error	173.62	59.59	156.35	75.02
Min. Horz. Error	0.02	0.05	0.01	0.12
Avg. Lat. Error	-0.21	-0.66	-0.33	-0.74
Stddev. Lat. Error	9.39	7.4	10.51	8.11
Max. Lat. Error	134.87	31.72	120.34	43.04
Min. Lat. Error	-124.94	-58.31	-143.49	-74.28
Avg. Abs. Lat. Error	4.71	3.67	5.13	3.89
Stddev. Abs. Lat. Error	8.12	6.46	9.17	7.15
Max. Abs. Lat. Error	134.87	58.31	143.49	74.28
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.84	0.51	0.92	0.44
Stddev. Long. Error	8.63	7.96	10.06	9.61
Max. Long. Error	96.16	33.16	97.63	57.59
Min. Long. Error	-109.33	-39.15	-99.82	-56.73
Avg. Abs. Long. Error	5.57	5.59	6.61	6.66
Stddev. Abs. Long. Error	6.65	5.69	7.63	6.94
Max. Abs. Long. Error	109.33	39.15	99.82	57.59
Min. Abs. Long. Error	0	0.01	0	0
Avg. Vert. Error	-111.93	-35.3	-173.17	-139.25
Stddev. Vert. Error	1930.07	1895.78	2047.12	1894.59
Max. Vert. Error	37473.73	22311.16	38907.87	13328.09
Min. Vert. Error	-10485.7	-7974.83	-9483.61	-8910.64
Avg. Abs. Vert. Error	771.12	819.37	836.94	858.13
Stddev. Abs. Vert. Error	1772.85	1709.76	1876.19	1694.6
Max. Abs. Vert. Error	37473.73	22311.16	38907.87	13328.09
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	8.55	7.78	9.76	8.86
Stddev. Slant Range Error	9.51	7.64	10.83	8.96
Max. Slant Range Error	173.7	59.59	156.48	75.02
Min. Slant Range Error	0.02	0.05	0.01	0.12

Figure A.1- 95 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	1800	
Horizontal Phase of Flight	Straight	Turn
Sample Quantity	4254	637
Avg. Horz. Error	10.78	9.51
Stddev. Horz. Error	11.7	10.41
Max. Horz. Error	169.84	112.98
Min. Horz. Error	0.04	0.24
Avg. Lat. Error	-0.4	-0.74
Stddev. Lat. Error	10.93	9.48
Max. Lat. Error	117.09	29.62
Min. Lat. Error	-155.99	-91.1
Avg. Abs. Lat. Error	5.27	3.83
Stddev. Abs. Lat. Error	9.58	8.7
Max. Abs. Lat. Error	155.99	91.1
Min. Abs. Lat. Error	0	0
Avg. Long. Error	0.95	-0.39
Stddev. Long. Error	11.52	10.41
Max. Long. Error	98.01	41.35
Min. Long. Error	-78.53	-66.82
Avg. Abs. Long. Error	7.66	7.31
Stddev. Abs. Long. Error	8.66	7.41
Max. Abs. Long. Error	98.01	66.82
Min. Abs. Long. Error	0	0.01
Avg. Vert. Error	-210.65	23.33
Stddev. Vert. Error	2127.36	2234.08
Max. Vert. Error	31668.16	23241.93
Min. Vert. Error	-10550	-8192.79
Avg. Abs. Vert. Error	885.61	945.76
Stddev. Abs. Vert. Error	1945.65	2023.8
Max. Abs. Vert. Error	31668.16	23241.93
Min. Abs. Vert. Error	0	0
Avg. Slant Range Error	10.8	9.52
Stddev. Slant Range Error	11.7	10.4
Max. Slant Range Error	169.84	112.98
Min. Slant Range Error	0.04	0.36

Figure A.1- 96 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

A.1.3.2 Statistical Tests



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	30644	1.18965	1.04870	0.00599
TRN	5284	1.29264	1.26544	0.01741

Means Comparisons			
Dif=Mean[i]-Mean[j]	TRN	STR	
TRN	0.000000	0.102987	
STR	-0.10299	0.000000	

Alpha= 0.05
 Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96003$

Abs(Dif)-LSD	TRN	STR
TRN	-0.04131	0.071358
STR	0.071358	-0.01715

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

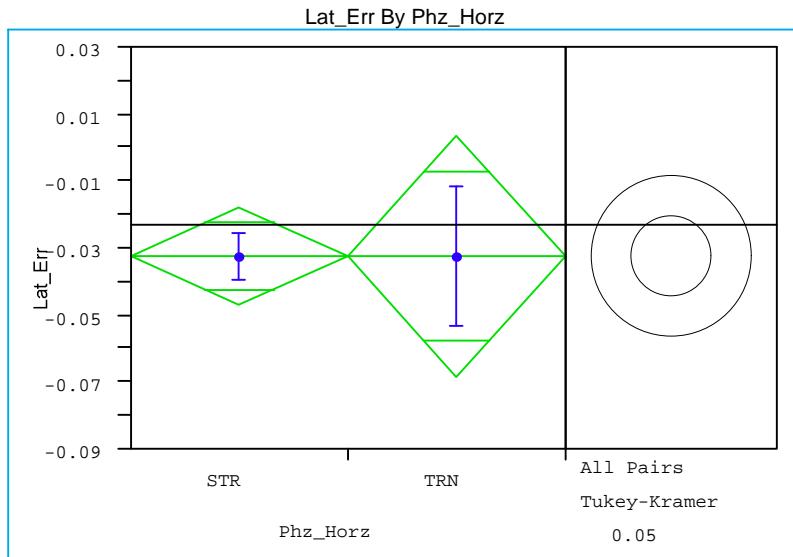
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	30644	1.048704	0.7002294	0.6736421
TRN	5284	1.265439	0.7923162	0.7528604

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	9.1359	1	35926	0.0025
Brown-Forsythe	37.0686	1	35926	<.0001
Levene	57.6468	1	35926	<.0001
Bartlett	346.9744	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

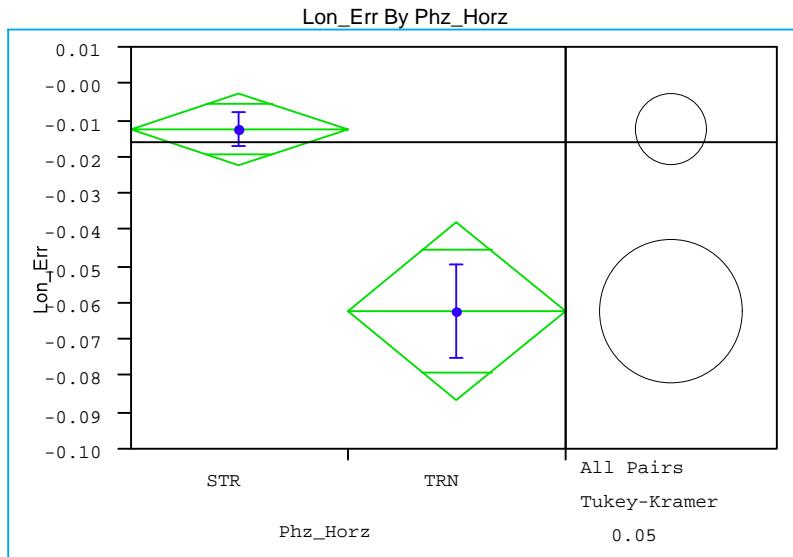
F Ratio	DF Num	DF Den	Prob>F
31.2921	1	6592.4	<.0001
t-Test			
5.5939			

Figure A.1- 97 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



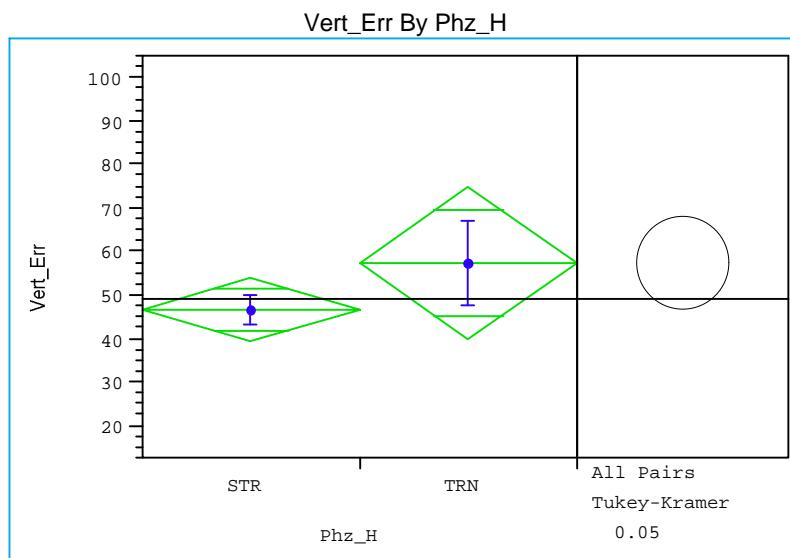
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	30644	-0.02227	1.30628	0.00746	
TRN	5284	-0.0265	1.53523	0.02112	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.004228		
TRN		-0.00423	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96003			
Abs(Dif)-LSD		STR	TRN		
STR		-0.02126	-0.03496		
TRN		-0.03496	-0.05119		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	30644	1.306283		0.8559916	0.8557251
TRN	5284	1.535231		0.9606380	0.9599589
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	28.5693	1	35926	<.0001	
Brown-Forsythe	46.9795	1	35926	<.0001	
Levene	47.3959	1	35926	<.0001	
Bartlett	253.3457	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
0.0356	1	6666.5	0.8503		
t-Test					
0.1888					

Figure A.1- 98 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	30644	-0.00921	0.898964	0.00514
TRN	5284	-0.05507	0.954927	0.01314
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.045861	
TRN		-0.04586	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96003		
Abs(Dif)-LSD		STR	TRN	
STR		-0.01437	0.019368	
TRN		0.019368	-0.0346	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	30644	0.8989641	0.6020186	0.6020029
TRN	5284	0.9549275	0.6440687	0.6434889
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		1.2949	1	35926
Brown-Forsythe		17.1044	1	35926
Levene		17.5826	1	35926
Bartlett		33.8112	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	10.5717	1	6992.8	0.0012
	t-Test			
	3.2514			

Figure A.1- 99 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	30644	47.1888	649.950	3.713
TRN	5284	61.9253	733.672	10.093

Means Comparisons		
Dif=Mean[i]-Mean[j]	TRN	STR
TRN	0.0000	14.7365
STR	-14.7365	0.0000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96003$
Abs(Dif)-LSD TRN STR
TRN -25.2791 -4.6183
STR -4.6183 -10.4971

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

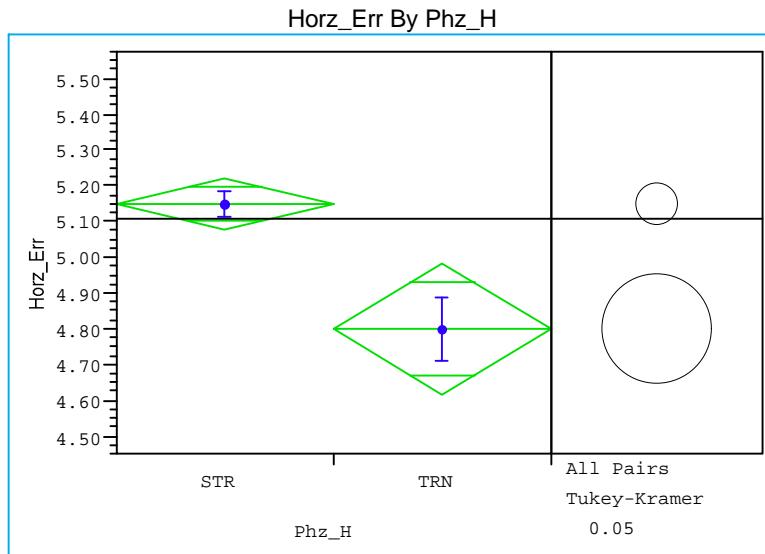
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	30644	649.9503	217.6595	193.1017
TRN	5284	733.6721	292.4736	268.0528

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.5220	1	35926	0.4700
Brown-Forsythe	63.3651	1	35926	<.0001
Levene	65.2706	1	35926	<.0001
Bartlett	139.9948	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.8777	1	6788.1	0.1706
t-Test			
1.3703			

Figure A.1- 100 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	20696	5.15568	5.49140	0.03817
TRN	3268	4.80602	5.29839	0.09268

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.000000	0.349667
TRN	-0.34967	0.000000

Alpha= 0.05
 Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96007$

Abs(Dif)-LSD	STR	TRN
STR	-0.10531	0.148018
TRN	0.148018	-0.26502

Positive values show pairs of means that are significantly different.

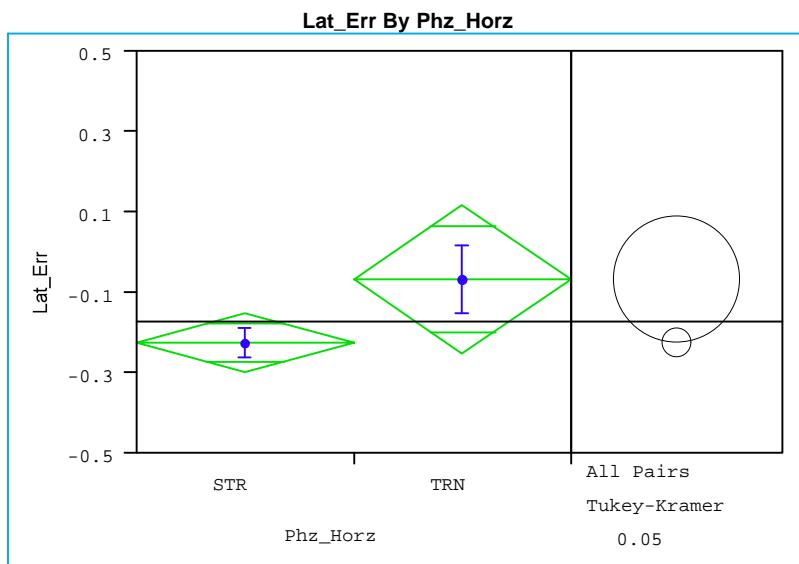
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	20696	5.491399	3.696338	3.394160
TRN	3268	5.298388	3.416439	3.143605

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.3511	1	23962	0.5535
Brown-Forsythe	8.2575	1	23962	0.0041
Levene	13.4178	1	23962	0.0002
Bartlett	7.0994	1	?	0.0077

Welch Anova testing Means Equal, allowing Std's Not Equal

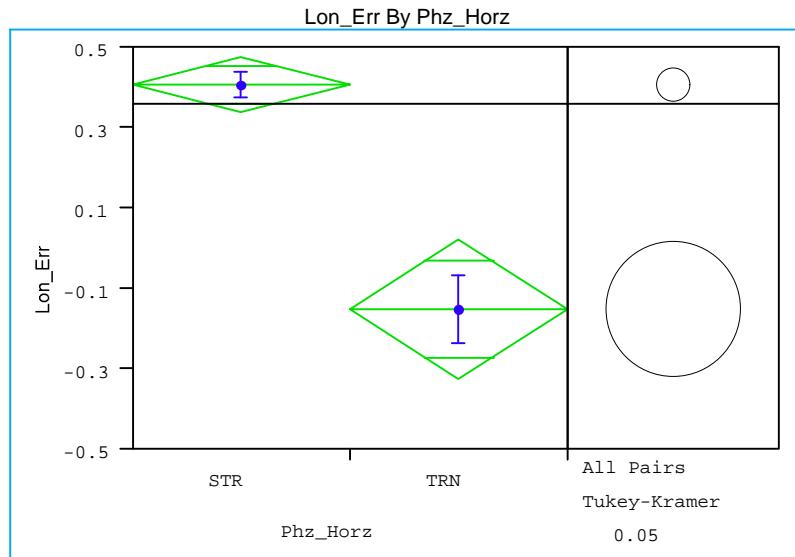
F Ratio	DF Num	DF Den	Prob>F
12.1691	1	4449.1	0.0005
t-Test			
3.4884			

Figure A.1- 101 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



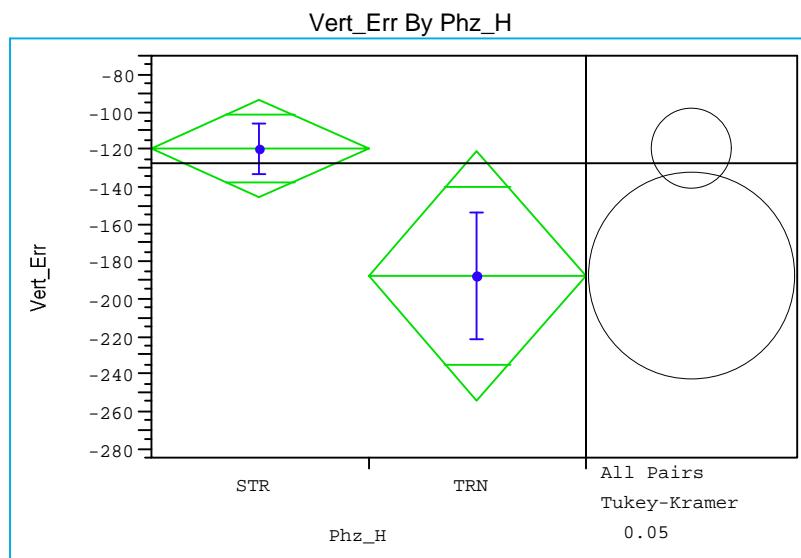
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
STR	20696	-0.18927	5.49054	0.03817	
TRN	3268	-0.05444	5.05091	0.08835	
Means Comparisons					
Dif=Mean[i]-Mean[j]		TRN	STR		
TRN		0.000000	0.134832		
STR		-0.13483	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96007$			
Abs(Dif)-LSD		TRN	STR		
TRN		-0.26343	-0.06561		
STR		-0.06561	-0.10468		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
STR	20696	5.490536	2.923887	2.903638	
TRN	3268	5.050909	2.617246	2.614011	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		3.2794	1	23962	0.0702
Brown-Forsythe		11.0991	1	23962	0.0009
Levene		12.5203	1	23962	0.0004
Bartlett		37.7387	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	1.9626	1	4574.8	0.1613	
t-Test					
	1.4009				

Figure A.1- 102 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	20696	0.440978	5.13435	0.03569	
TRN	3268	-0.14195	5.06389	0.08858	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.582923		
TRN		-0.58292	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96007			
Abs(Dif)-LSD		STR	TRN		
STR		-0.09875	0.393844		
TRN		0.393844	-0.2485		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	20696	5.134348		3.305220	3.302728
TRN	3268	5.063891		3.272833	3.268000
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0758	1	23962	0.7830	
Brown-Forsythe	0.2209	1	23962	0.6383	
Levene	0.1926	1	23962	0.6607	
Bartlett	1.0701	1	?	0.3009	
Welch Anova testing Means Equal, allowing Std's Not Equal					
F Ratio	DF Num	DF Den	Prob>F		
37.2569	1	4395.5	<.0001		
t-Test					
6.1038					

Figure A.1- 103 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	20696	-117.996	1956.29	13.598
TRN	3268	-180.929	1989.43	34.801

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.0000	62.9333
TRN	-62.9333	0.0000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q^*	1.96007
Abs(Dif)-LSD	

	STR	TRN
STR	-37.7820	-9.4117
TRN	-9.4117	-95.0795

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

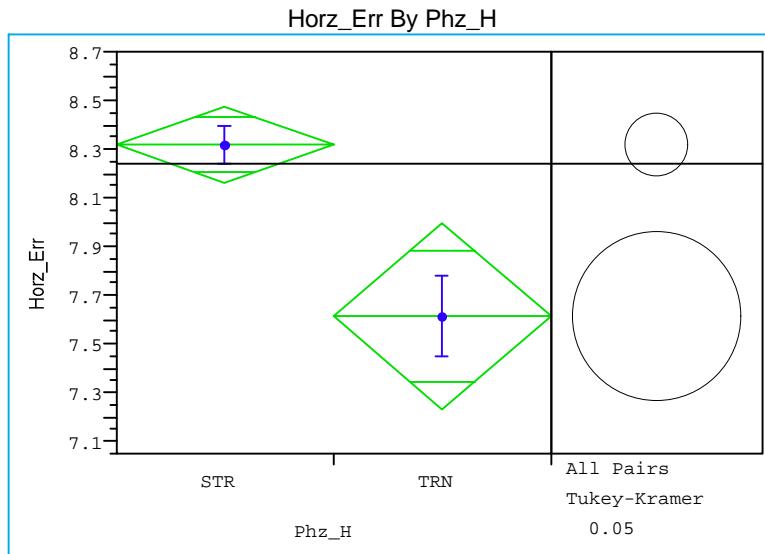
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	20696	1956.291	967.748	908.3291
TRN	3268	1989.430	1059.898	978.4901

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.2293	1	23962	0.6321
Brown-Forsythe	4.6031	1	23962	0.0319
Levene	8.3135	1	23962	0.0039
Bartlett	1.6052	1	?	0.2052

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
2.8371	1	4324.9	0.0922
t-Test			
1.6844			

Figure A.1- 104 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	11777	8.35655	9.07761	0.08365
TRN	2059	7.62214	7.68013	0.16925

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.00000	0.734415
TRN	-0.73442	0.00000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96014$

Abs(Dif)-LSD	STR	TRN
STR	-0.22692	0.318468
TRN	0.318468	-0.54271

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

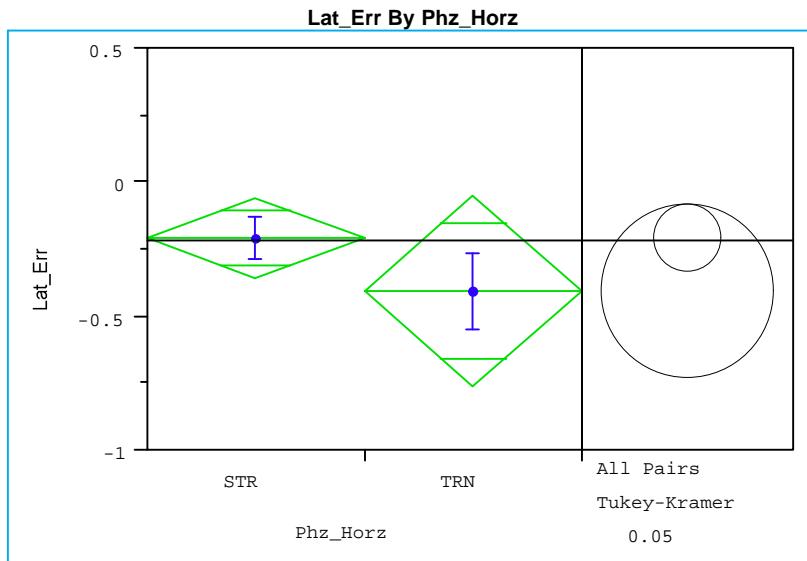
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	11777	9.077615	5.894810	5.459758
TRN	2059	7.680126	5.365415	4.950048

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.7312	1	13834	0.0534
Brown-Forsythe	8.0307	1	13834	0.0046
Levene	10.9023	1	13834	0.0010
Bartlett	90.4771	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

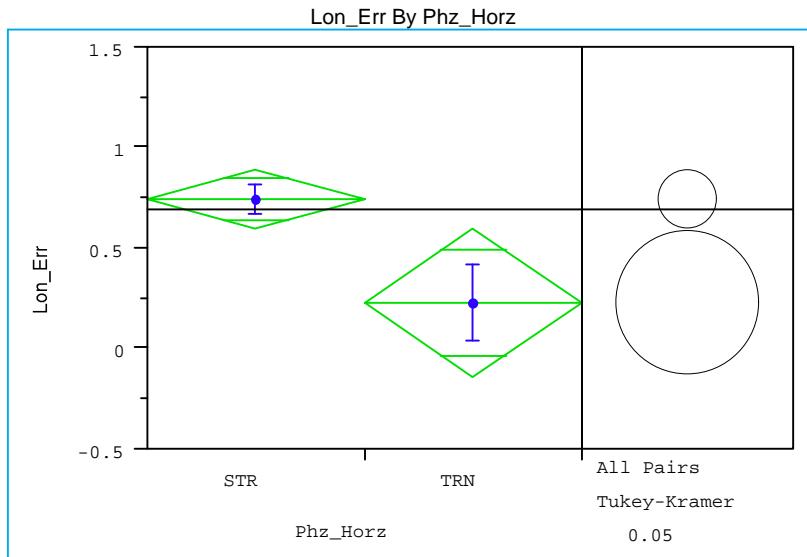
F Ratio	DF Num	DF Den	Prob>F
15.1320	1	3153.2	0.0001
t-Test			
3.8900			

Figure A.1- 105 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



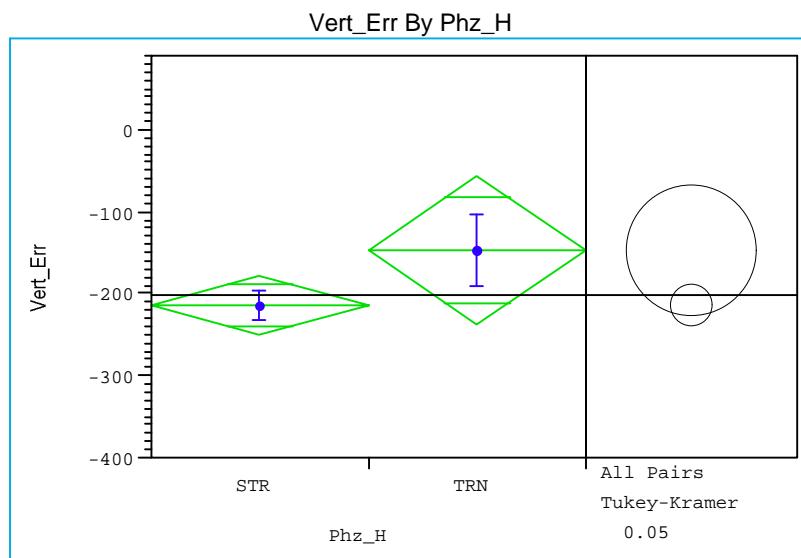
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
STR	11777	-0.18974	8.69899	0.08016	
TRN	2059	-0.34514	6.48552	0.14293	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.155399		
TRN		-0.1554	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96014$			
Abs(Dif)-LSD		STR	TRN		
STR		-0.21474	-0.23822		
TRN		-0.23822	-0.51357		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
STR	11777	8.698985	4.327187	4.305173	
TRN	2059	6.485523	3.369102	3.310283	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		12.0914	1	13834	0.0005
Brown-Forsythe		32.5365	1	13834	<.0001
Levene		30.3294	1	13834	<.0001
Bartlett		262.8820	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	0.8993	1	3495.8	0.3430	
t-Test					
	0.9483				

Figure A.1- 106 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	11777	0.775014	8.71389	0.08030	
TRN	2059	0.234513	8.65294	0.19069	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.540501		
TRN		-0.5405	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96014			
Abs(Dif)-LSD		STR	TRN		
STR		-0.22235	0.132926		
TRN		0.132926	-0.53178		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	11777	8.713893		5.676709	5.676294
TRN	2059	8.652936		5.808816	5.807731
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0194	1	13834	0.8891	
Brown-Forsythe	0.6987	1	13834	0.4032	
Levene	0.7061	1	13834	0.4008	
Bartlett	0.1721	1	?	0.6783	
Welch Anova testing Means Equal, allowing Std's Not Equal					
F Ratio	DF Num	DF Den	Prob>F		
6.8239	1	2836.9	0.0090		
t-Test					
2.6123					

Figure A.1- 107 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	11777	-211.733	2118.95	19.526
TRN	2059	-137.636	2082.79	45.901

Means Comparisons		
Dif=Mean[i]-Mean[j]	TRN	STR
TRN	0.0000	74.0965
STR	-74.0965	0.0000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96014$

Abs(Dif)-LSD	TRN	STR
TRN	-129.122	-24.866
STR	-24.866	-53.990

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

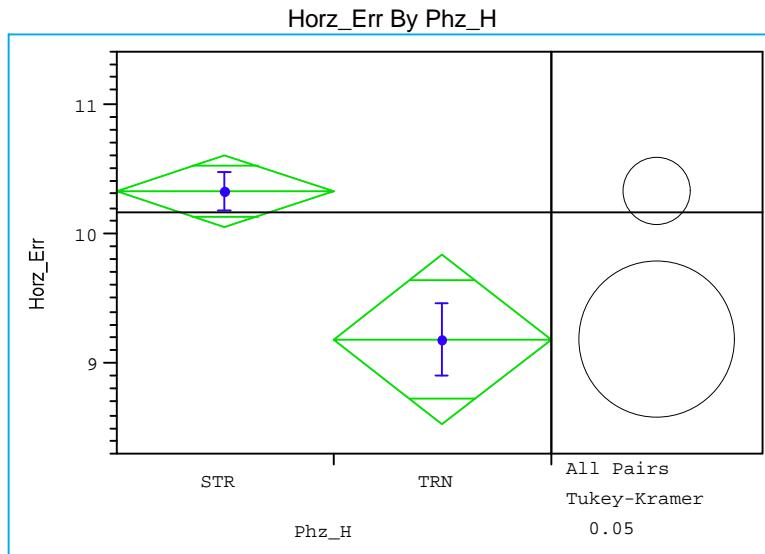
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	11777	2118.952	1083.927	974.422
TRN	2059	2082.791	1137.760	1079.431

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0647	1	13834	0.7993
Brown-Forsythe	5.4800	1	13834	0.0192
Levene	1.5511	1	13834	0.2130
Bartlett	1.0296	1	?	0.3103

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
2.2066	1	2853.9	0.1375
t-Test			
1.4855			

Figure A.1- 108 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5374	10.3600	11.1290	0.15181
TRN	1070	9.1972	9.6037	0.29359

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.00000	1.16277
TRN	-1.16277	0.00000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96033$

Abs(Dif)-LSD	STR	TRN
STR	-0.41186	0.448073
TRN	0.448073	-0.92301

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

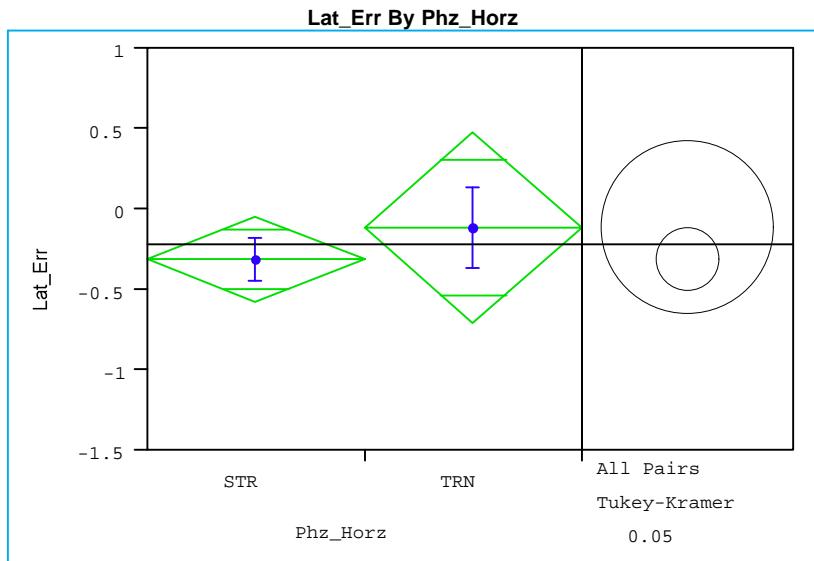
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5374	11.12897	7.176342	6.645693
TRN	1070	9.60369	6.144044	5.673951

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.3236	1	6442	0.1275
Brown-Forsythe	9.8134	1	6442	0.0017
Levene	13.7068	1	6442	0.0002
Bartlett	36.2444	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

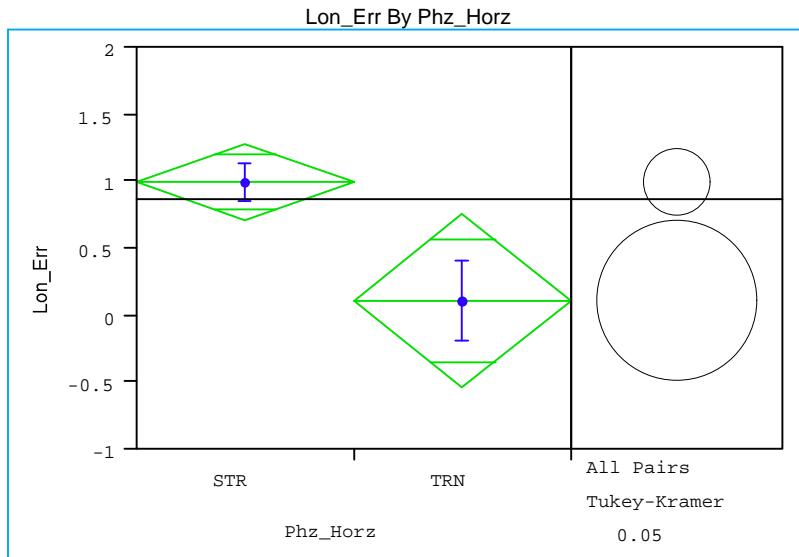
F Ratio	DF Num	DF Den	Prob>F
12.3762	1	1693	0.0004
t-Test			
3.5180			

Figure A.1- 109 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



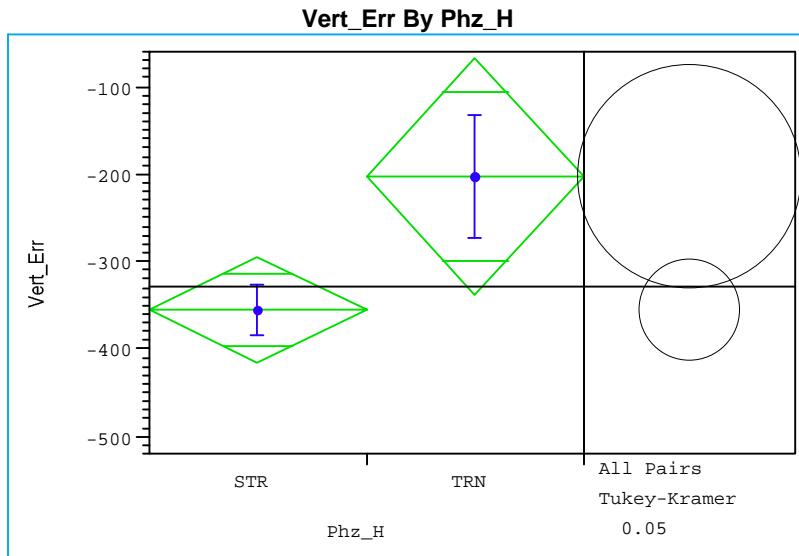
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5374	-0.24902	10.3318	0.14094
TRN	1070	-0.08491	8.5473	0.26130
Means Comparisons				
Dif=Mean[i]-Mean[j]			TRN	STR
TRN		0.000000	0.164114	
STR		-0.164111	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96033$		
Abs(Dif)-LSD			TRN	STR
TRN		-0.85241	-0.49591	
STR		-0.49591	-0.38036	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5374	10.33181	5.002420	4.965469
TRN	1070	8.54733	3.637925	3.623850
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		2.8305	1	6442
Brown-Forsythe		20.4680	1	6442
Levene		21.2774	1	6442
Bartlett		58.8292	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		0.3056	1	1752
		t-Test		
		0.5528		0.5805

Figure A.1- 110 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5374	1.02607	11.1059	0.15150
TRN	1070	0.11968	10.1892	0.31149
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.906391	
TRN		-0.90639	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96033		
Abs(Dif)-LSD		STR	TRN	
STR		-0.41445	0.187202	
TRN		0.187202	-0.92881	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5374	11.10594	7.405065	7.404787
TRN	1070	10.18923	7.222062	7.219848
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		2.4553	1	6442
Brown-Forsythe		0.4644	1	6442
Levene		0.4549	1	6442
Bartlett		12.7285	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		6.8474	1	1616.6
		t-Test		
		2.6167		
				Prob>F
				0.0090

Figure A.1- 111 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5374	-353.572	2288.19	31.213
TRN	1070	-194.444	2344.76	71.681

Means Comparisons			
Dif=Mean[i]-Mean[j]	TRN	STR	
TRN	0.000	159.127	
STR	-159.127	0.000	

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96033$

Abs(Dif)-LSD	TRN	STR
TRN	-194.734	8.344
STR	8.344	-86.893

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

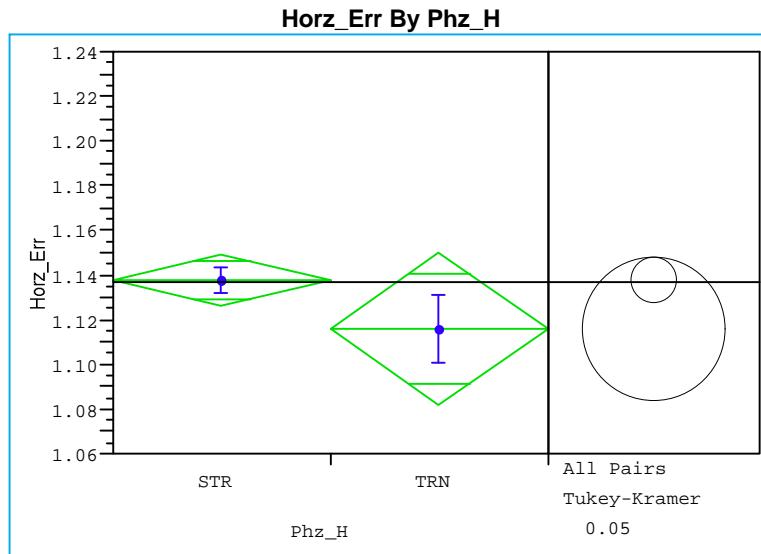
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5374	2288.185	1260.318	1079.647
TRN	1070	2344.763	1278.268	1199.168

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0756	1	6442	0.7834
Brown-Forsythe	3.0506	1	6442	0.0808
Levene	0.0781	1	6442	0.7799
Bartlett	1.0751	1	?	0.2998

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
4.1426	1	1502.1	0.0420
t-Test			
2.0353			

Figure A.1- 112 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	23358	1.13878	0.956849	0.00626
TRN	2790	1.12099	0.814684	0.01542

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.000000	0.017799
TRN	-0.0178	0.000000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96006$

Abs(Dif)-LSD	STR	TRN
STR	-0.0171	-0.01921
TRN	-0.01921	-0.04947

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

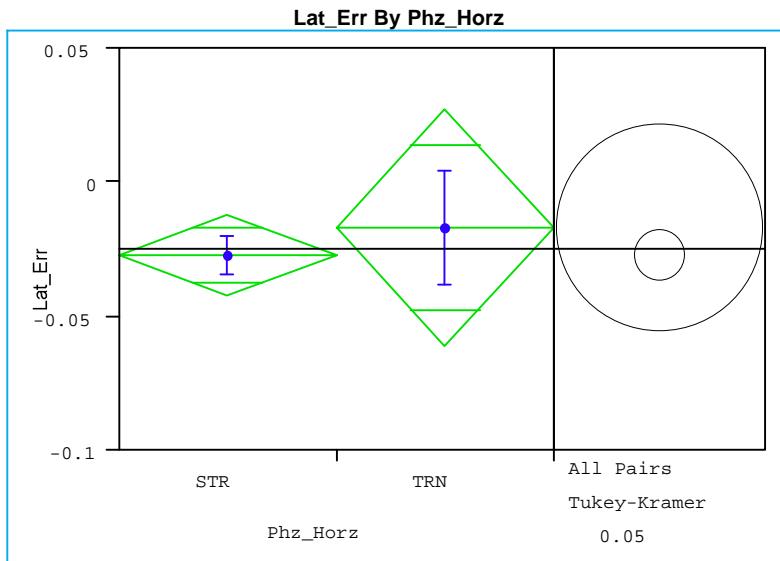
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	23358	0.9568488	0.6543072	0.6331895
TRN	2790	0.8146839	0.6252144	0.6084381

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.1246	1	26146	0.2889
Brown-Forsythe	2.8779	1	26146	0.0898
Levene	4.5412	1	26146	0.0331
Bartlett	118.5084	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

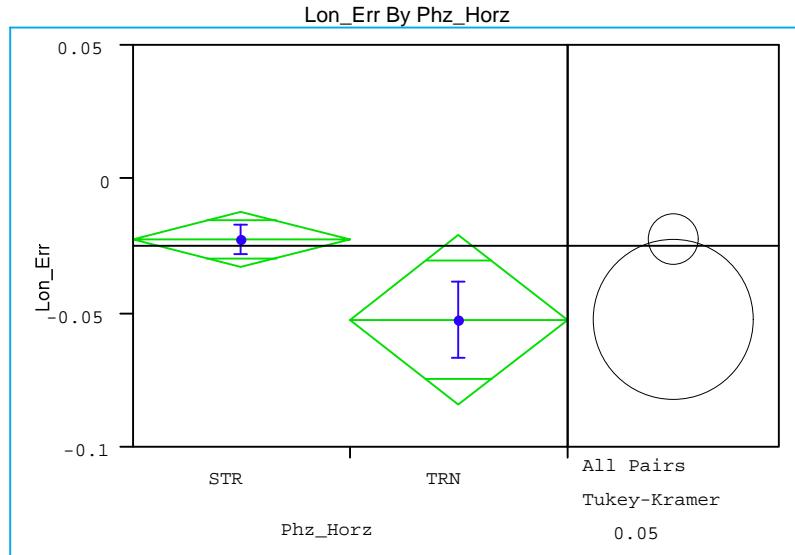
F Ratio	DF Num	DF Den	Prob>F
1.1433	1	3771.6	0.2850
t-Test			
1.0693			

Figure A.1- 113 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



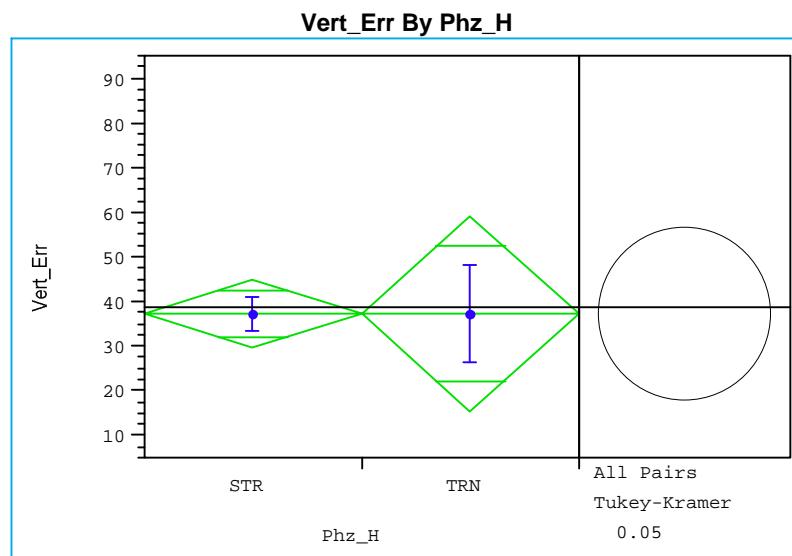
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	23358	-0.02597	1.20545	0.00789
TRN	2790	-0.01611	1.14651	0.02171
Means Comparisons				
Dif=Mean[i]-Mean[j]			TRN	STR
TRN		0.000000		0.009859
STR		-0.00986		0.000000
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96006$		
Abs(Dif)-LSD			TRN	STR
TRN		-0.06294		-0.03723
STR		-0.03723		-0.02175
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	23358	1.205451	0.8046062	0.8042065
TRN	2790	1.146515	0.7982615	0.7978787
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		0.8749	1	26146
Brown-Forsythe		0.1258	1	26146
Levene		0.1267	1	26146
Bartlett		12.1946	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		0.1822	1	3566.7
		t-Test		
		0.4269		0.6695

Figure A.1- 114 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	23358	-0.02193	0.870736	0.00570	
TRN	2790	-0.04635	0.777087	0.01471	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.024420		
TRN		-0.02442	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96006$			
Abs(Dif)-LSD		STR	TRN		
STR		-0.01562	-0.00939		
TRN		-0.00939	-0.0452		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	23358	0.8707357		0.5903900	0.5903219
TRN	2790	0.7770872		0.5965265	0.5965178
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.3093	1	26146	0.2525	
Brown-Forsythe	0.2437	1	26146	0.6215	
Levene	0.2392	1	26146	0.6248	
Bartlett	60.7791	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
2.3960	1	3678.4	0.1217		
t-Test					
1.5479					

Figure A.1- 115 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	23358	38.3347	591.230	3.868
TRN	2790	42.5057	597.128	11.305

Means Comparisons		
Dif=Mean[i]-Mean[j]	TRN	STR
TRN	0.00000	4.17099
STR	-4.17099	0.00000

Alpha= 0.05
 Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96006$
 Abs(Dif)-LSD TRN STR
 TRN -31.0601 -19.0665
 STR -19.0665 -10.7346

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

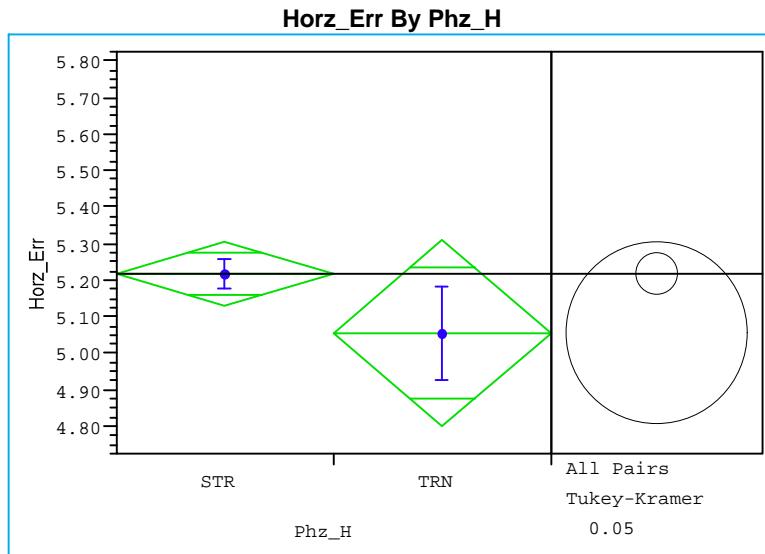
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	23358	591.2304	159.2353	135.3072
TRN	2790	597.1281	173.5532	150.0385

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0008	1	26146	0.9776
Brown-Forsythe	1.6240	1	26146	0.2026
Levene	1.5748	1	26146	0.2095
Bartlett	0.4934	1	?	0.4824

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.1219	1	3474.7	0.7270
t-Test			
0.3491			

Figure A.1- 116 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	16318	5.23890	5.69627	0.04459
TRN	1892	5.05890	5.74944	0.13218

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.000000	0.180003
TRN	-0.18	0.000000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96010$

Abs(Dif)-LSD	STR	TRN
STR	-0.12373	-0.09142
TRN	-0.09142	-0.36337

Positive values show pairs of means that are significantly different.
Tests that the Variances are Equal

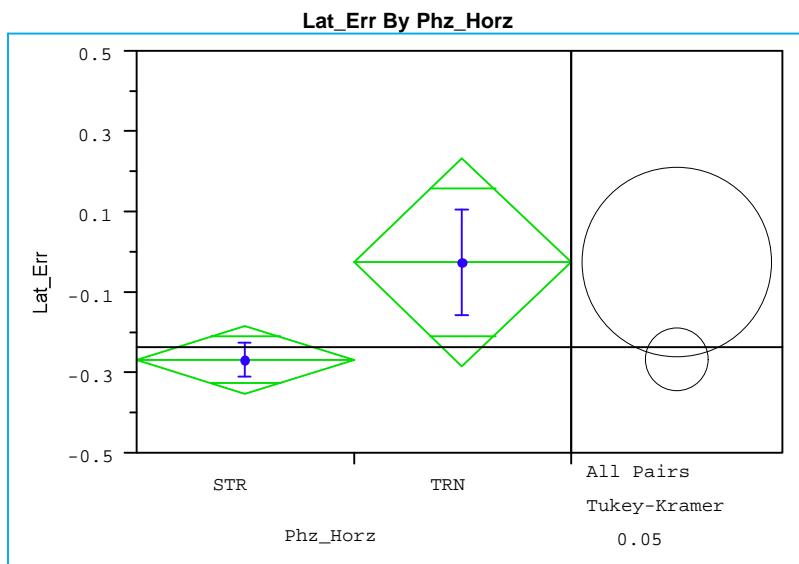
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	16318	5.696270	3.835836	3.501459
TRN	1892	5.749441	3.717368	3.372649

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0153	1	18208	0.9016
Brown-Forsythe	1.1879	1	18208	0.2758
Levene	1.3302	1	18208	0.2488
Bartlett	0.2940	1	?	0.5877

Welch Anova testing Means Equal, allowing Std's Not Equal

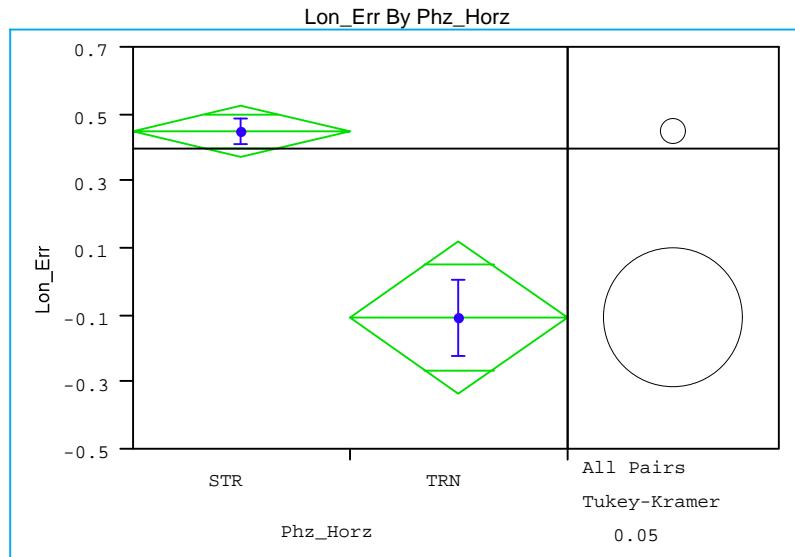
F Ratio	DF Num	DF Den	Prob>F
1.6650	1	2342.4	0.1971
t-Test			
1.2904			

Figure A.1- 117 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



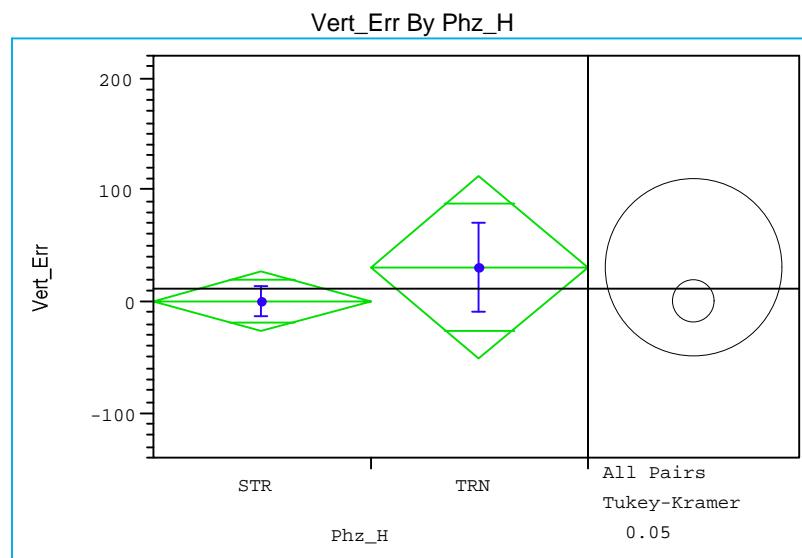
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	16318	-0.2597	5.82078	0.04557	
TRN	1892	-0.00098	5.77924	0.13286	
Means Comparisons					
Dif=Mean[i]-Mean[j]		TRN	STR		
TRN		0.000000	0.258717		
STR		-0.25872	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96010$			
Abs(Dif)-LSD		TRN	STR		
TRN		-0.37067	-0.01817		
STR		-0.01817	-0.12622		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	16318	5.820778		3.114442	3.078079
TRN	1892	5.779244		2.890671	2.890516
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0169	1	18208	0.8967	
Brown-Forsythe	2.4318	1	18208	0.1189	
Levene	3.4979	1	18208	0.0615	
Bartlett	0.1731	1	?	0.6774	
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	3.3926	1	2358.2	0.0656	
t-Test	1.8419				

Figure A.1- 118 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	16318	0.456530	5.07326	0.03971	
TRN	1892	-0.08975	5.02537	0.11553	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.546280		
TRN		-0.54628	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96010$			
Abs(Dif)-LSD		STR	TRN		
STR		-0.10998	0.305012		
TRN		0.305012	-0.32299		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	16318	5.073258		3.236401	3.231738
TRN	1892	5.025372		3.323618	3.323467
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0207	1	18208	0.8857	
Brown-Forsythe	0.9378	1	18208	0.3329	
Levene	0.8511	1	18208	0.3563	
Bartlett	0.3032	1	?	0.5819	
Welch Anova testing Means Equal, allowing Std's Not Equal					
F Ratio	DF Num	DF Den	Prob>F		
19.9945	1	2360.5	<.0001		
t-Test					
4.4715					

Figure A.1- 119 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	16318	10.0765	1820.98	14.255
TRN	1892	39.1177	1808.85	41.586

Means Comparisons		
Dif=Mean[i]-Mean[j]	TRN	STR
TRN	0.0000	29.0413
STR	-29.0413	0.0000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96010$

Abs(Dif)-LSD	TRN	STR
TRN	-115.968	-57.584
STR	-57.584	-39.488

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

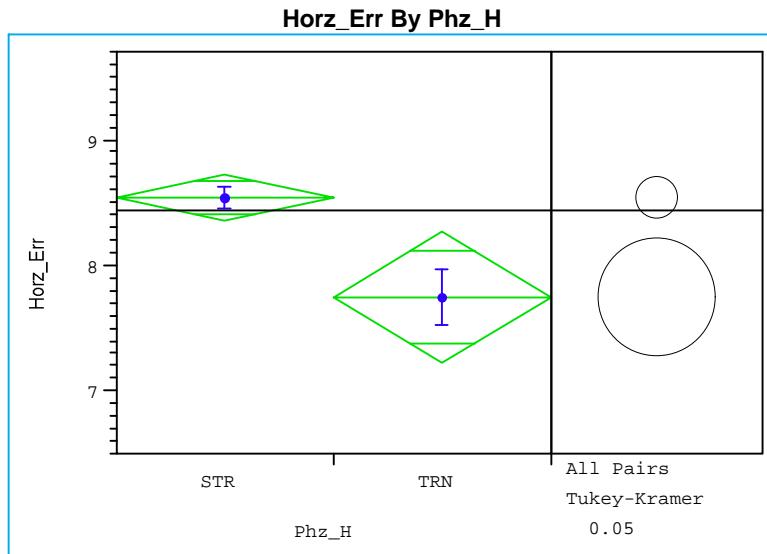
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	16318	1820.979	777.3691	771.0343
TRN	1892	1808.851	800.4795	779.4070

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0157	1	18208	0.9002
Brown-Forsythe	0.0438	1	18208	0.8343
Levene	0.3350	1	18208	0.5628
Bartlett	0.1508	1	?	0.6978

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.4364	1	2357.7	0.5089
t-Test			
0.6606			

Figure A.1- 120 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
STR	9175	8.53584	9.51142	0.09930
TRN	1199	7.76842	7.64834	0.22088

Means Comparisons

Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.000000	0.767420
TRN	-0.76742	0.000000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96019$

Abs(Dif)-LSD	STR	TRN
STR	-0.26959	0.206687
TRN	0.206687	-0.74576

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	9175	9.511425	6.109777	5.633776
TRN	1199	7.648342	5.397756	4.964420

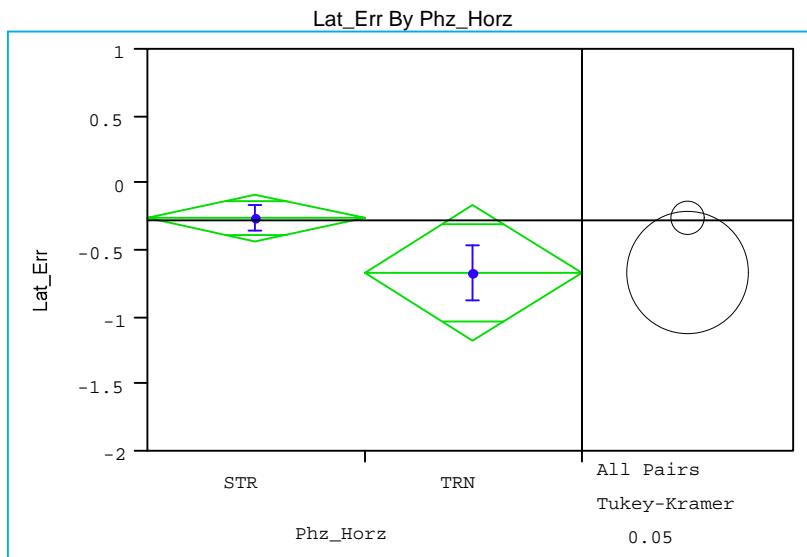
Test F Ratio DF Num DF Den Prob>F

O'Brien[.5]	3.2807	1	10372	0.0701
Brown-Forsythe	7.4841	1	10372	0.0062
Levene	10.6699	1	10372	0.0011
Bartlett	90.0718	1	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

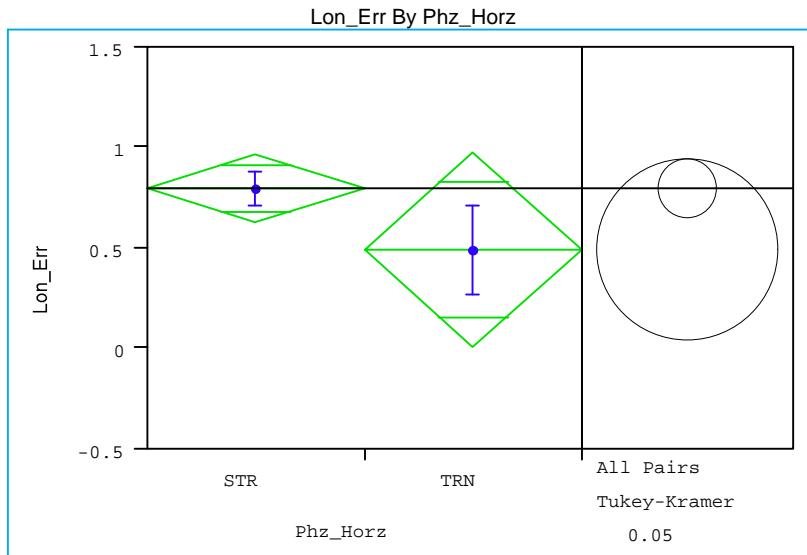
F Ratio	DF Num	DF Den	Prob>F
10.0417	1	1722	0.0016
t-Test			
3.1689			

Figure A.1- 121 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



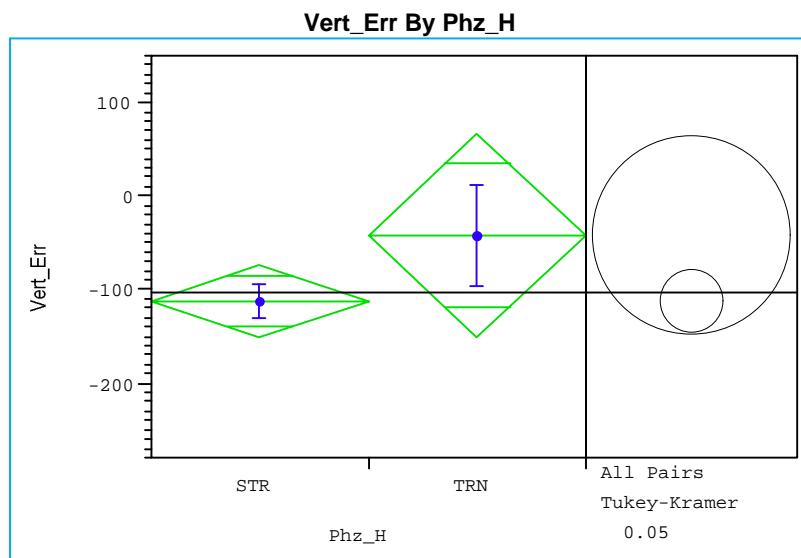
Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	9175	-0.21317	9.38578	0.09799
TRN	1199	-0.66354	7.40428	0.21383
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.450373	
TRN		-0.45037	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96019		
Abs(Dif)-LSD		STR	TRN	
STR		-0.26564	-0.10214	
TRN		-0.10214	-0.73483	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	9175	9.385777	4.743009	4.714468
TRN	1199	7.404276	3.825791	3.672525
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		5.5623	1	10372
Brown-Forsythe		18.2386	1	10372
Levene		14.2379	1	10372
Bartlett		105.5457	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		3.6662	1	1743.9
		t-Test		
		1.9147		
				Prob>F
				0.0557

Figure A.1- 122 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	9175	0.835531	8.63130	0.09011
TRN	1199	0.513125	7.96043	0.22989
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.322406	
TRN		-0.32241	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96019		
Abs(Dif)-LSD		STR	TRN	
STR		-0.24763	-0.19265	
TRN		-0.19265	-0.68502	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	
			MeanAbsDif to Median	
STR	9175	8.631296	5.547993	5.543110
TRN	1199	7.960427	5.580866	5.580622
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		1.1268	1	10372
Brown-Forsythe		0.0351	1	10372
Levene		0.0270	1	10372
Bartlett		13.3068	1	?
Prob>F				
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		1.7048	1	1589.5
		t-Test		
		1.3057		
			Prob>F	
			0.1918	

Figure A.1- 123 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	9175	-111.926	1930.07	20.150
TRN	1199	-35.298	1895.78	54.749

Means Comparisons			
Dif=Mean[i]-Mean[j]	TRN	STR	
TRN	0.0000	76.6284	
STR	-76.6284	0.0000	

Alpha= 0.05
 Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96019$

Abs(Dif)-LSD	TRN	STR
TRN	-154.203	-39.315
STR	-39.315	-55.744

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

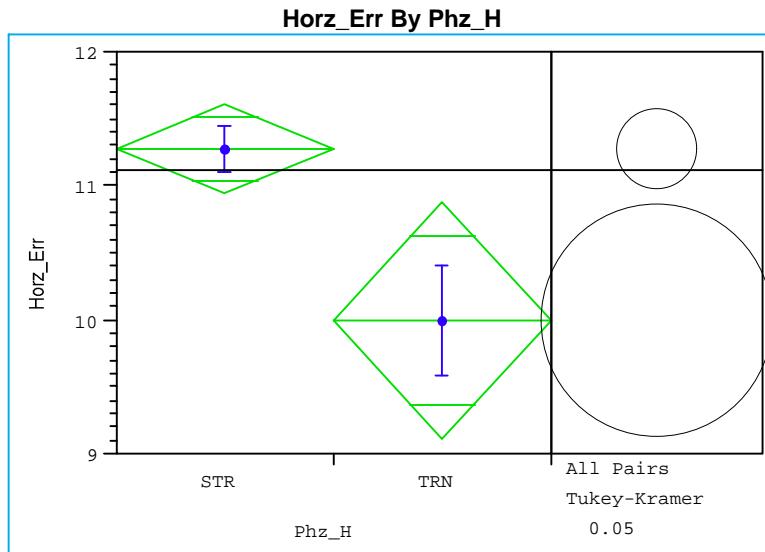
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	9175	1930.066	836.1124	771.1156
TRN	1199	1895.776	838.4980	819.3713

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.0248	1	10372	0.8750
Brown-Forsythe	0.7920	1	10372	0.3735
Levene	0.0020	1	10372	0.9643
Bartlett	0.6746	1	?	0.4115

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.7253	1	1540.8	0.1892
t-Test			
1.3135			

Figure A.1- 124 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	4254	10.7846	11.7023	0.17942
TRN	637	9.5064	10.4089	0.41241

Means Comparisons		
Dif=Mean[i]-Mean[j]	STR	TRN
STR	0.00000	1.27821
TRN	-1.27821	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 1.96045$	
Abs(Dif)-LSD	
STR	STR
STR	-0.49064
TRN	0.31687
TRN	0.31687
TRN	-1.26792

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

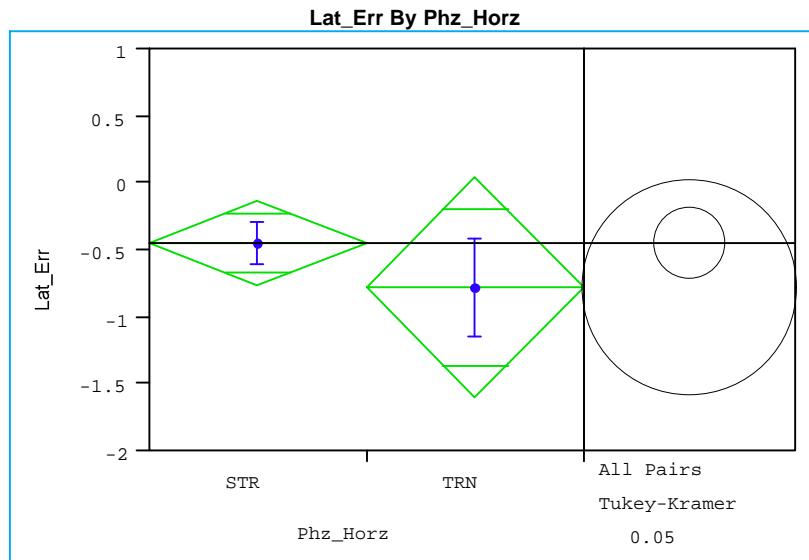
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	4254	11.70232	7.510429	6.954786
TRN	637	10.40887	6.378097	5.888848

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.9388	1	4889	0.3326
Brown-Forsythe	6.4649	1	4889	0.0110
Levene	9.0099	1	4889	0.0027
Bartlett	14.3189	1	?	0.0002

Welch Anova testing Means Equal, allowing Std's Not Equal

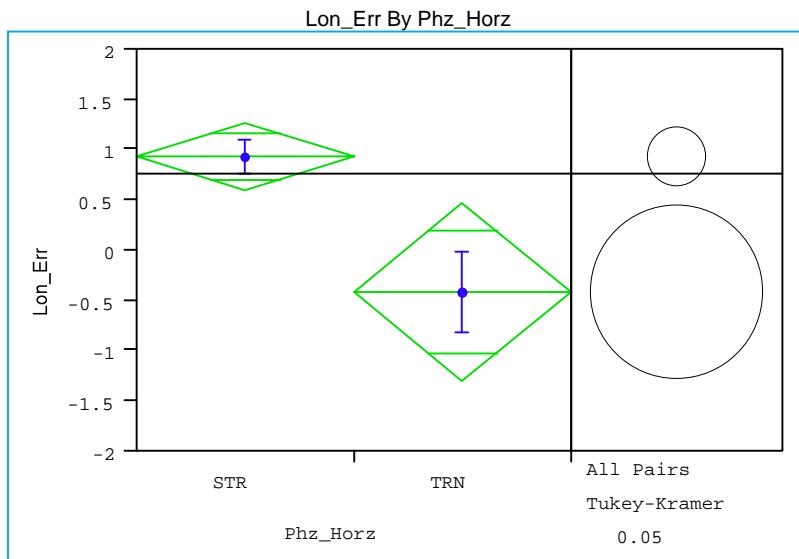
F Ratio	DF Num	DF Den	Prob>F
8.0771	1	894.74	0.0046
t-Test			
2.8420			

Figure A.1- 125 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



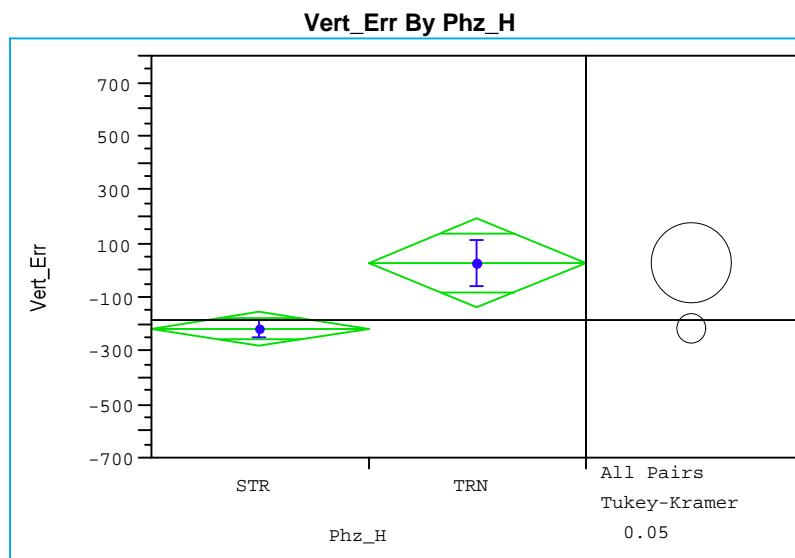
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	4254	-0.40004	10.9280	0.16755	
TRN	637	-0.73659	9.4788	0.37556	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.336548		
TRN		-0.33655	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96045$			
Abs(Dif)-LSD		STR	TRN		
STR		-0.45698	-0.55885		
TRN		-0.55885	-1.18095		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	4254	10.92798		5.353029	5.267601
TRN	637	9.47882		4.043594	3.830462
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.0814	1	4889	0.2984	
Brown-Forsythe	12.7507	1	4889	0.0004	
Levene	10.7328	1	4889	0.0011	
Bartlett	20.8636	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
0.6697	1	908.97	0.4134		
t-Test					
0.8184					

Figure A.1- 126 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	4254	0.951593	11.5236	0.17668	
TRN	637	-0.39177	10.4074	0.41235	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.00000	1.34336		
TRN		-1.34336	0.00000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96045$			
Abs(Dif)-LSD		STR	TRN		
STR		-0.48394	0.39516		
TRN		0.39516	-1.25060		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	4254	11.52359		7.627530	7.625923
TRN	637	10.40737		7.303754	7.303065
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.9631	1	4889	0.1612	
Brown-Forsythe	0.8011	1	4889	0.3708	
Levene	0.8063	1	4889	0.3693	
Bartlett	10.9159	1	?	0.0010	
F Ratio	DF Num	DF Den	Prob>F		
8.9670	1	886.49	0.0028		
t-Test					
2.9945					

Figure A.1- 127 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	4254	-210.646	2127.36	32.617
TRN	637	23.332	2234.08	88.517

Means Comparisons		
Dif=Mean[i]-Mean[j]	TRN	STR
TRN	0.000	233.978
STR	-233.978	0.000

Alpha= 0.05
Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 1.96045$

Abs(Dif)-LSD	TRN	STR
TRN	-235.249	55.611
STR	55.611	-91.033

Positive values show pairs of means that are significantly different.
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	4254	2127.360	1009.336	885.6140
TRN	637	2234.076	957.289	945.7591

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.1250	1	4889	0.7237
Brown-Forsythe	0.5238	1	4889	0.4692
Levene	0.4192	1	4889	0.5174
Bartlett	2.7141	1	?	0.0995

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
6.1517	1	818.18	0.0133
t-Test			
2.4803			

Figure A.1- 128 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.1.4 Vertical Phase of Flight Per Look Ahead Time

A.1.4.1 Summary Tables

Look Ahead Time	0			300		
	Level	Ascent	Descent	Level	Ascent	Descent
Vertical Phase of Flight						
Sample Quantity	27915	4378	3635	24176	2150	3473
Avg. Horz. Error	1.19	1.21	1.35	2.95	4.71	3.71
Stddev. Horz. Error	1.04	0.88	1.51	3.25	3.9	3.76
Max. Horz. Error	42.39	11.19	16.91	84.31	50.76	63.15
Min. Horz. Error	0	0	0	0.01	0.02	0.02
Avg. Lat. Error	-0.02	-0.08	0.04	-0.09	-0.13	-0.13
Stddev. Lat. Error	1.29	1.28	1.76	3.51	4.44	3.96
Max. Lat. Error	32.23	8.32	11.67	65.49	38.93	22.62
Min. Lat. Error	-13.68	-5.18	-16	-39.47	-22.4	-36.24
Avg. Abs. Lat. Error	0.84	0.93	1.02	1.88	2.66	2.23
Stddev. Abs. Lat. Error	0.97	0.88	1.44	2.97	3.56	3.28
Max. Abs. Lat. Error	32.23	8.32	16	65.49	38.93	36.24
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	-0.02	0.07	-0.08	-0.01	1.45	-0.11
Stddev. Long. Error	0.91	0.77	1	2.62	3.94	3.49
Max. Long. Error	11.93	3.58	9.33	25.52	20.1	19.67
Min. Long. Error	-27.53	-11.19	-9.81	-65.39	-32.58	-63.13
Avg. Abs. Long. Error	0.61	0.54	0.65	1.71	3.09	2.33
Stddev. Abs. Long. Error	0.68	0.55	0.77	1.98	2.84	2.6
Max. Abs. Long. Error	27.53	11.19	9.81	65.39	32.58	63.13
Min. Abs. Long. Error	0	0	0	0	0	0
Avg. Vert. Error	43.04	143.42	-15.44	-22.97	996.7	-516.74
Stddev. Vert. Error	619.13	640.23	944.25	1140.53	2952.07	2644.55
Max. Vert. Error	36817	16745.34	7949	14714.2	14101	34817
Min. Vert. Error	-6824.15	-2010.37	-4734	-12244.5	-10885.8	-12626.9
Avg. Abs. Vert. Error	120.39	435.5	568.52	415.04	2271.07	2013.62
Stddev. Abs. Vert. Error	608.84	490.68	754.02	1062.58	2132.71	1790.23
Max. Abs. Vert. Error	36817	16745.34	7949	14714.2	14101	34817
Min. Abs. Vert. Error	0	0	0	0	0	0
Avg. Slant Range Error	1.19	1.21	1.36	2.95	4.75	3.76
Stddev. Slant Range Error	1.05	0.88	1.51	3.25	3.88	3.74
Max. Slant Range Error	42.39	11.52	16.91	84.34	50.76	63.15
Min. Slant Range Error	0	0	0	0.01	0.06	0.08

Figure A.1- 129 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	600			900		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	20064	818	3082	15766	230	2533
Avg. Horz. Error	4.86	8.45	5.82	6.61	13.56	7.54
Stddev. Horz. Error	5.34	6.42	5.63	7.23	10.25	6.91
Max. Horz. Error	125.68	38.68	73.81	167.79	76.9	92.08
Min. Horz. Error	0.02	0.04	0.04	0.02	0.23	0.06
Avg. Lat. Error	-0.21	0.25	-0.03	-0.27	0.5	0.09
Stddev. Lat. Error	5.41	6.76	5.19	7.03	8.87	6.47
Max. Lat. Error	97.45	29.34	34.75	129.48	43.07	64.16
Min. Lat. Error	-61.74	-28.48	-37.37	-94.55	-27.26	-43.4
Avg. Abs. Lat. Error	2.8	4.02	2.97	3.56	5.24	3.61
Stddev. Abs. Lat. Error	4.63	5.43	4.25	6.06	7.17	5.37
Max. Abs. Lat. Error	97.45	29.34	37.37	129.48	43.07	64.16
Min. Abs. Lat. Error	0	0	0	0	0.01	0
Avg. Long. Error	0.2	4.1	0.45	0.43	7.06	0.51
Stddev. Long. Error	4.78	7.08	6.2	6.81	12.68	7.91
Max. Long. Error	91.73	31.85	73.8	94.25	39.37	66.05
Min. Long. Error	-79.36	-32.6	-42.72	-106.71	-76.71	-59.55
Avg. Abs. Long. Error	3.07	6.18	4.07	4.37	10.74	5.45
Stddev. Abs. Long. Error	3.67	5.37	4.69	5.24	9.75	5.75
Max. Abs. Long. Error	91.73	32.6	73.8	106.71	76.71	66.05
Min. Abs. Long. Error	0	0.01	0	0	0.07	0
Avg. Vert. Error	-93.56	1322.7	-726.17	-120.46	810.29	-666.06
Stddev. Vert. Error	1551.14	3799.44	3080.04	1721.64	3518.2	3089.16
Max. Vert. Error	20728.9	20033	28933	30746.5	20083	22083
Min. Vert. Error	-15373.8	-9233	-14433.7	-16419.3	-6400	-15260.4
Avg. Abs. Vert. Error	610.27	2963.65	2377.63	691.68	2700.92	2367.68
Stddev. Abs. Vert. Error	1429.11	2719.09	2087.87	1581.17	2389.62	2092.51
Max. Abs. Vert. Error	20728.9	20033	28933	30746.5	20083	22083
Min. Abs. Vert. Error	0	0	0	0	16.39	0
Avg. Slant Range Error	4.87	8.49	5.86	6.62	13.58	7.58
Stddev. Slant Range Error	5.34	6.4	5.61	7.23	10.24	6.89
Max. Slant Range Error	125.72	38.68	73.82	167.86	76.9	92.08
Min. Slant Range Error	0.02	0.17	0.15	0.03	0.29	0.11

Figure A.1- 130 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1200			1500		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	11878	67	1891	8394	22	1262
Avg. Horz. Error	8.14	15.88	8.65	9.33	13.14	9.47
Stddev. Horz. Error	9	13.46	7.81	10.22	12.97	9.13
Max. Horz. Error	173.62	62.8	68.48	156.35	50.19	72.96
Min. Horz. Error	0.02	0.72	0.04	0.01	3.11	0.11
Avg. Lat. Error	-0.32	0.62	0.41	-0.42	-3.78	1
Stddev. Lat. Error	8.6	9.9	6.98	9.63	13.25	8.33
Max. Lat. Error	134.87	29.67	53.61	120.34	16.99	65.64
Min. Lat. Error	-124.94	-46.11	-66.12	-143.49	-40.37	-70.8
Avg. Abs. Lat. Error	4.2	5.21	3.85	4.6	7.16	4.37
Stddev. Abs. Lat. Error	7.51	8.42	5.84	8.47	11.69	7.16
Max. Abs. Lat. Error	134.87	46.11	66.12	143.49	40.37	70.8
Min. Abs. Lat. Error	0	0.02	0	0	0.03	0
Avg. Long. Error	0.56	6.09	1.33	0.68	2.87	1.48
Stddev. Long. Error	8.53	17.36	9.23	9.91	12.25	10.02
Max. Long. Error	96.16	39.2	48.6	97.63	27.67	44.17
Min. Long. Error	-109.33	-62.47	-60.41	-99.82	-32.7	-56.49
Avg. Abs. Long. Error	5.56	13.48	6.52	6.59	9.14	6.95
Stddev. Abs. Long. Error	6.5	12.42	6.66	7.44	8.45	7.37
Max. Abs. Long. Error	109.33	62.47	60.41	99.82	32.7	56.49
Min. Abs. Long. Error	0	0.52	0	0	0.51	0.01
Avg. Vert. Error	-125.54	366.59	-692.95	-167.37	1720.92	-1015.01
Stddev. Vert. Error	1861.58	3022.95	3212.21	1966.21	5173.23	3302.33
Max. Vert. Error	37473.73	15524.09	15561.15	38907.87	20104.51	11333
Min. Vert. Error	-15900	-5733	-13410.8	-15900	-2899	-17219.3
Avg. Abs. Vert. Error	744.35	1904.83	2500.94	822	2641.13	2658.72
Stddev. Abs. Vert. Error	1710.89	2364.59	2130.9	1793.94	4749.44	2205
Max. Abs. Vert. Error	37473.73	15524.09	15561.15	38907.87	20104.51	17219.3
Min. Abs. Vert. Error	0	0	0	0	182.91	0
Avg. Slant Range Error	8.15	15.89	8.69	9.34	13.16	9.51
Stddev. Slant Range Error	8.99	13.46	7.79	10.22	12.98	9.11
Max. Slant Range Error	173.7	62.8	68.48	156.48	50.3	72.96
Min. Slant Range Error	0.02	0.77	0.15	0.01	3.11	0.16

Figure A.1- 131 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1800		
Vertical Phase of Flight	Level	Ascent	Descent
Sample Quantity	5652	11	781
Avg. Horz. Error	10.23	8.6	9.71
Stddev. Horz. Error	11.1	5.07	9.34
Max. Horz. Error	169.84	20.52	72.73
Min. Horz. Error	0.04	3.89	0.19
Avg. Lat. Error	-0.45	-0.67	1.44
Stddev. Lat. Error	10.24	4.54	8.53
Max. Lat. Error	117.09	5.05	72.43
Min. Lat. Error	-155.99	-13.55	-30.86
Avg. Abs. Lat. Error	4.8	1.99	4.35
Stddev. Abs. Lat. Error	9.05	4.09	7.48
Max. Abs. Lat. Error	155.99	13.55	72.43
Min. Abs. Lat. Error	0	0.07	0
Avg. Long. Error	0.79	-2.91	1.57
Stddev. Long. Error	11.06	8.75	10.22
Max. Long. Error	98.01	7.18	41.28
Min. Long. Error	-78.53	-20.51	-62.08
Avg. Abs. Long. Error	7.44	7.64	7.31
Stddev. Abs. Long. Error	8.23	4.66	7.3
Max. Abs. Long. Error	98.01	20.51	62.08
Min. Abs. Long. Error	0	2.78	0
Avg. Vert. Error	-220.69	2367.53	-1135.5
Stddev. Vert. Error	2072.25	4803.94	3374.12
Max. Vert. Error	31668.16	16540.79	11033
Min. Vert. Error	-15800	-200	-12044.6
Avg. Abs. Vert. Error	868.83	2403.89	2750.38
Stddev. Abs. Vert. Error	1894.19	4784.03	2258.63
Max. Abs. Vert. Error	31668.16	16540.79	12044.58
Min. Abs. Vert. Error	0	0	3.91
Avg. Slant Range Error	10.24	8.62	9.75
Stddev. Slant Range Error	11.1	5.1	9.32
Max. Slant Range Error	169.84	20.52	72.73
Min. Slant Range Error	0.04	3.89	0.37

Figure A.1- 132 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	0			300		
	Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent
Sample Quantity	21791	2345	2012	18964	1673	1863
Avg. Horz. Error	1.14	1.15	1.04	3	4.78	3.54
Stddev. Horz. Error	0.96	0.87	0.78	3.42	3.98	4
Max. Horz. Error	42.39	11.19	4.68	84.31	50.76	63.15
Min. Horz. Error	0	0	0	0.01	0.02	0.02
Avg. Lat. Error	-0.02	-0.08	0	-0.11	-0.13	-0.29
Stddev. Lat. Error	1.21	1.21	1.11	3.7	4.52	4.1
Max. Lat. Error	32.23	8.32	4.27	65.49	38.93	19.22
Min. Lat. Error	-6.04	-5.18	-4.5	-39.47	-22.4	-36.24
Avg. Abs. Lat. Error	0.8	0.86	0.75	1.95	2.6	2.21
Stddev. Abs. Lat. Error	0.9	0.86	0.82	3.15	3.69	3.47
Max. Abs. Lat. Error	32.23	8.32	4.5	65.49	38.93	36.24
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	-0.03	0.09	-0.05	0	1.72	0
Stddev. Long. Error	0.88	0.77	0.68	2.64	3.92	3.41
Max. Long. Error	11.93	3.58	2.53	25.52	20.1	19.67
Min. Long. Error	-27.53	-11.19	-2.81	-65.39	-32.58	-63.13
Avg. Abs. Long. Error	0.6	0.55	0.53	1.7	3.21	2.13
Stddev. Abs. Long. Error	0.65	0.54	0.44	2.02	2.83	2.66
Max. Abs. Long. Error	27.53	11.19	2.81	65.39	32.58	63.13
Min. Abs. Long. Error	0	0	0	0	0	0
Avg. Vert. Error	33.86	164.9	-54.94	-0.98	926.65	-102.63
Stddev. Vert. Error	582.1	689.82	548.35	1028.54	2786.63	2659.6
Max. Vert. Error	36817	16745.34	1699.79	14714.2	14101	34817
Min. Vert. Error	-2800	-1515.37	-2264.79	-8000	-10304.6	-9892.71
Avg. Abs. Vert. Error	79.21	436.46	412.27	334.12	2073.49	1944.84
Stddev. Abs. Vert. Error	577.68	558.99	365.59	972.76	2079.08	1816.48
Max. Abs. Vert. Error	36817	16745.34	2264.79	14714.2	14101	34817
Min. Abs. Vert. Error	0	0	0	0	0	0
Avg. Slant Range Error	1.15	1.16	1.05	3.01	4.82	3.6
Stddev. Slant Range Error	0.97	0.87	0.78	3.41	3.97	3.97
Max. Slant Range Error	42.39	11.52	4.69	84.34	50.76	63.15
Min. Slant Range Error	0	0	0	0.01	0.06	0.08

Figure A.1- 133 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	600			900		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	15821	790	1599	12478	224	1270
Avg. Horz. Error	5.01	8.5	5.64	6.83	13.62	7.33
Stddev. Horz. Error	5.61	6.36	5.71	7.57	9.98	7.46
Max. Horz. Error	125.68	38.68	51.38	167.79	76.9	92.08
Min. Horz. Error	0.02	0.04	0.04	0.03	0.23	0.06
Avg. Lat. Error	-0.26	0.23	-0.19	-0.34	0.44	0.24
Stddev. Lat. Error	5.77	6.74	5.74	7.57	8.98	7.44
Max. Lat. Error	97.45	29.34	34.75	129.48	43.07	64.16
Min. Lat. Error	-61.74	-28.48	-37.37	-94.55	-27.26	-43.4
Avg. Abs. Lat. Error	3	4.01	3.17	3.87	5.31	4.07
Stddev. Abs. Lat. Error	4.94	5.42	4.78	6.51	7.25	6.23
Max. Abs. Lat. Error	97.45	29.34	37.37	129.48	43.07	64.16
Min. Abs. Lat. Error	0	0	0	0	0.01	0
Avg. Long. Error	0.22	4.27	0.28	0.45	7.49	0.28
Stddev. Long. Error	4.82	7.01	5.61	6.81	12.2	7.35
Max. Long. Error	91.73	31.85	25.54	94.25	39.37	66.05
Min. Long. Error	-79.36	-22.09	-35.26	-106.71	-76.71	-59.55
Avg. Abs. Long. Error	3.05	6.25	3.7	4.35	10.76	4.75
Stddev. Abs. Long. Error	3.73	5.32	4.22	5.26	9.43	5.61
Max. Abs. Long. Error	91.73	31.85	35.26	106.71	76.71	66.05
Min. Abs. Long. Error	0	0.01	0	0	0.07	0
Avg. Vert. Error	-20.23	1329.85	-307.77	-29.38	840.91	-329.29
Stddev. Vert. Error	1426.57	3826.34	3063.43	1594.72	3546.01	3215.15
Max. Vert. Error	20728.9	20033	28933	30746.5	20083	22083
Min. Vert. Error	-10000	-9233	-10552	-10700	-6400	-9797.11
Avg. Abs. Vert. Error	507.3	2980.59	2298.72	579.34	2736.66	2396.95
Stddev. Abs. Vert. Error	1333.46	2741.62	2047.42	1486.05	2400.32	2166.98
Max. Abs. Vert. Error	20728.9	20033	28933	30746.5	20083	22083
Min. Abs. Vert. Error	0	0	0	0	16.39	0
Avg. Slant Range Error	5.02	8.54	5.69	6.84	13.64	7.38
Stddev. Slant Range Error	5.61	6.34	5.68	7.56	9.97	7.44
Max. Slant Range Error	125.72	38.68	51.38	167.86	76.9	92.08
Min. Slant Range Error	0.02	0.29	0.15	0.03	0.29	0.11

Figure A.1- 134 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	1200			1500		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	9360	60	954	6627	20	660
Avg. Horz. Error	8.43	15.11	8.16	9.71	13.99	8.85
Stddev. Horz. Error	9.41	11.15	8.11	10.76	13.33	9.05
Max. Horz. Error	173.62	49.91	68.48	156.35	50.19	72.96
Min. Horz. Error	0.02	0.72	0.04	0.01	3.11	0.11
Avg. Lat. Error	-0.36	0.54	0.64	-0.52	-4.56	1.15
Stddev. Lat. Error	9.29	10.37	7.86	10.37	13.67	8.62
Max. Lat. Error	134.87	29.67	53.61	120.34	16.99	65.64
Min. Lat. Error	-124.94	-46.11	-66.12	-143.49	-40.37	-70.8
Avg. Abs. Lat. Error	4.62	5.41	4.28	5.02	7.47	4.51
Stddev. Abs. Lat. Error	8.07	8.83	6.62	9.09	12.25	7.43
Max. Abs. Lat. Error	134.87	46.11	66.12	143.49	40.37	70.8
Min. Abs. Lat. Error	0	0.02	0	0	0.03	0
Avg. Long. Error	0.7	8.99	1.25	0.8	3.38	1.48
Stddev. Long. Error	8.52	12.91	8.29	10.08	12.77	9.09
Max. Long. Error	96.16	39.2	39.23	97.63	27.67	44.17
Min. Long. Error	-109.33	-19.1	-60.41	-99.82	-32.7	-56.49
Avg. Abs. Long. Error	5.52	12.59	5.57	6.66	9.83	6.14
Stddev. Abs. Long. Error	6.53	9.36	6.26	7.61	8.56	6.85
Max. Abs. Long. Error	109.33	39.2	60.41	99.82	32.7	56.49
Min. Abs. Long. Error	0	0.52	0	0	0.51	0.03
Avg. Vert. Error	-57.6	393.25	-580.42	-103.97	1828.02	-883.58
Stddev. Vert. Error	1735.54	3155.29	3150.19	1829.04	5424.51	3239.87
Max. Vert. Error	37473.73	15524.09	15561.15	38907.87	20104.51	11333
Min. Vert. Error	-8230.95	-5733	-10485.7	-8330.24	-2899	-9483.61
Avg. Abs. Vert. Error	603.38	1986.48	2401	663.35	2840.24	2547.37
Stddev. Abs. Vert. Error	1628.28	2469.84	2118.99	1707.66	4944.82	2186.27
Max. Abs. Vert. Error	37473.73	15524.09	15561.15	38907.87	20104.51	11333
Min. Abs. Vert. Error	0	0	0	0	182.91	0
Avg. Slant Range Error	8.44	15.13	8.2	9.72	14.02	8.89
Stddev. Slant Range Error	9.4	11.14	8.08	10.76	13.33	9.02
Max. Slant Range Error	173.7	49.91	68.48	156.48	50.3	72.96
Min. Slant Range Error	0.02	0.77	0.15	0.01	3.11	0.3

Figure A.1- 135 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	1800		
Vertical Phase of Flight	Level	Ascent	Descent
Sample Quantity	4446	10	435
Avg. Horz. Error	10.81	8.88	8.69
Stddev. Horz. Error	11.8	5.25	8.45
Max. Horz. Error	169.84	20.52	62.23
Min. Horz. Error	0.04	3.89	0.19
Avg. Lat. Error	-0.6	-1.24	1.16
Stddev. Lat. Error	11.01	4.35	7.53
Max. Lat. Error	117.09	0.75	53.61
Min. Lat. Error	-155.99	-13.55	-30.86
Avg. Abs. Lat. Error	5.21	1.69	3.84
Stddev. Abs. Lat. Error	9.72	4.18	6.58
Max. Abs. Lat. Error	155.99	13.55	53.61
Min. Abs. Lat. Error	0	0.07	0
Avg. Long. Error	0.81	-2.93	0.55
Stddev. Long. Error	11.57	9.22	9.42
Max. Long. Error	98.01	7.18	41.28
Min. Long. Error	-78.53	-20.51	-62.08
Avg. Abs. Long. Error	7.73	8.12	6.44
Stddev. Abs. Long. Error	8.65	4.61	6.89
Max. Abs. Long. Error	98.01	20.51	62.08
Min. Abs. Long. Error	0	3.88	0
Avg. Vert. Error	-116.41	2414.28	-891.51
Stddev. Vert. Error	1966.69	5061.16	3299.07
Max. Vert. Error	31668.16	16540.79	11033
Min. Vert. Error	-8050.02	-200	-10550
Avg. Abs. Vert. Error	721.23	2454.28	2617.76
Stddev. Abs. Vert. Error	1833.34	5039.74	2193.63
Max. Abs. Vert. Error	31668.16	16540.79	11033
Min. Abs. Vert. Error	0	0	3.91
Avg. Slant Range Error	10.82	8.91	8.73
Stddev. Slant Range Error	11.8	5.28	8.43
Max. Slant Range Error	169.84	20.52	62.25
Min. Slant Range Error	0.04	3.89	0.37

Figure A.1- 136 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

A.1.4.2 Statistical Tests

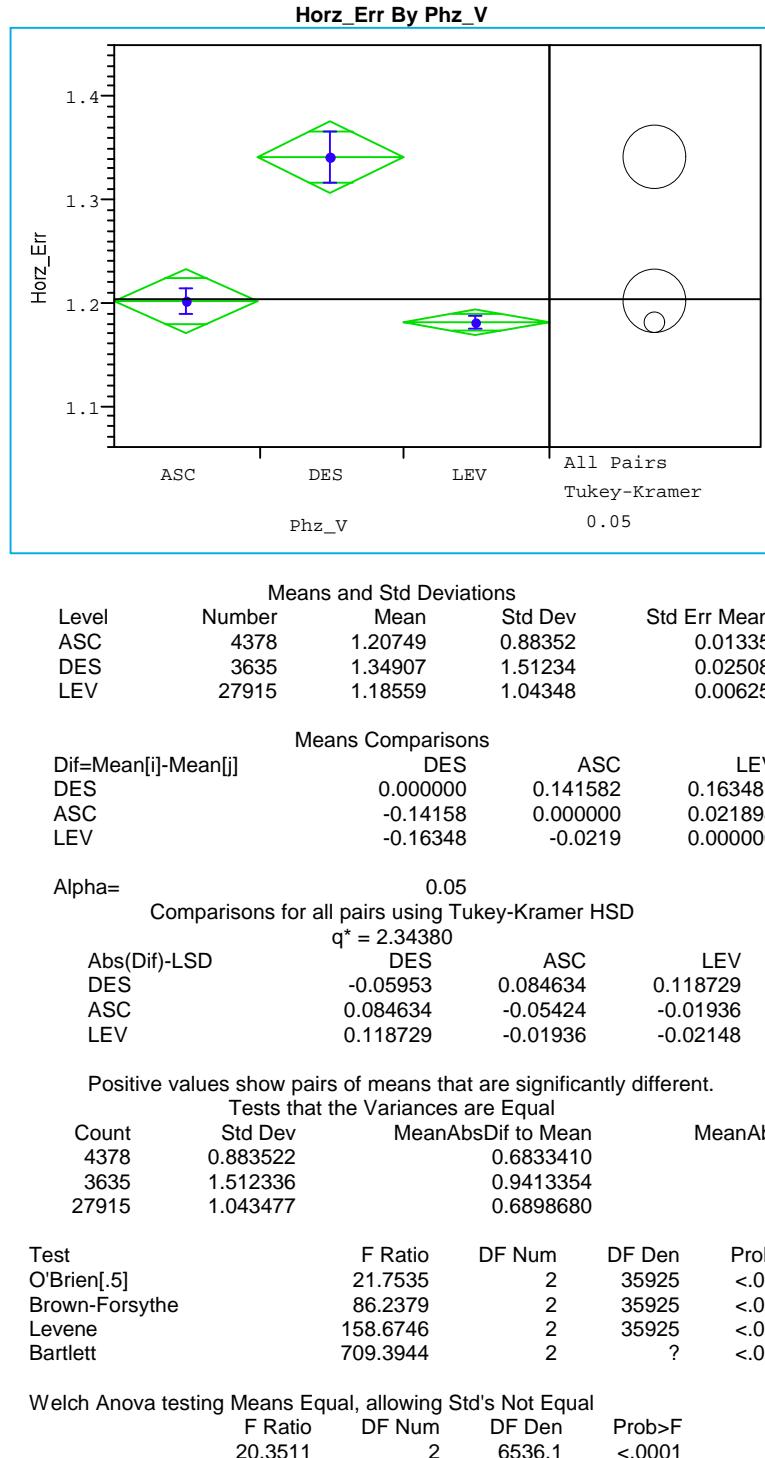
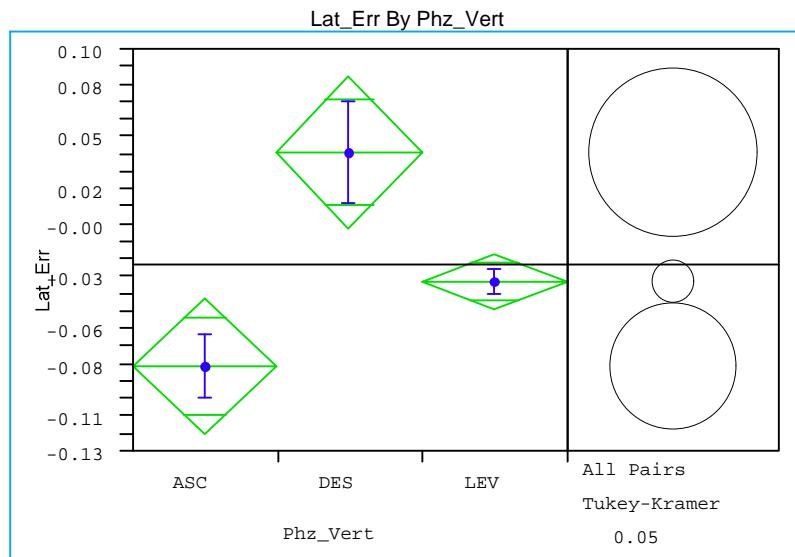
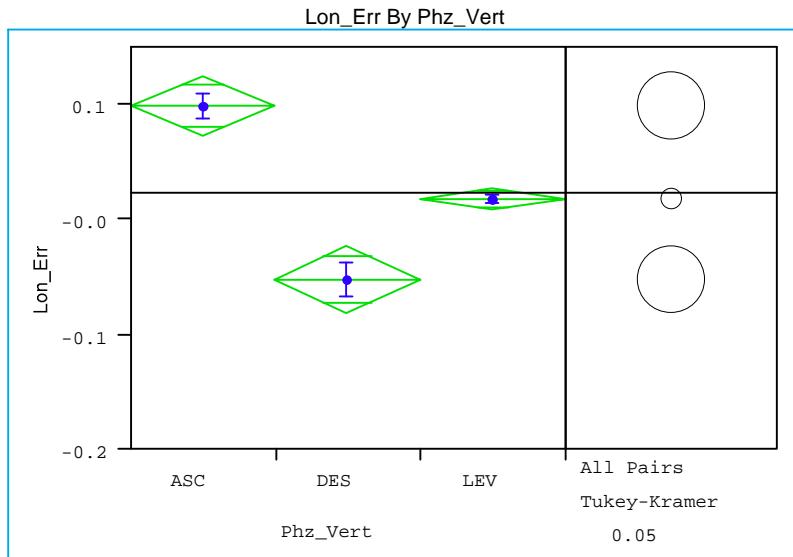


Figure A.1- 137 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	4378	-0.07751	1.27855	0.01932	
DES	3635	0.042201	1.76059	0.02920	
LEV	27915	-0.02281	1.28779	0.00771	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DES	LEV	ASC	
DES		0.000000	0.065006	0.119712	
LEV		-0.06501	0.000000	0.054706	
ASC		-0.11971	-0.05471	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34380$				
Abs(Dif)-LSD		DES	LEV	ASC	
DES		-0.07379	0.009539	0.049126	
LEV		0.009539	-0.02663	0.003572	
ASC		0.049126	0.003572	-0.06723	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	4378	1.278546	0.931243	0.930869	
DES	3635	1.760591	1.017777	1.016730	
LEV	27915	1.287788	0.842900	0.842389	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		51.1363	2	35925	<.0001
Brown-Forsythe		55.6273	2	35925	<.0001
Levene		55.9512	2	35925	<.0001
Bartlett		379.7888	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	6.3653	2	6360.8	0.0017	

Figure A.1- 138 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	4378	0.067060	0.770570	0.01165
DES	3635	-0.08469	0.999504	0.01658
LEV	27915	-0.02002	0.913888	0.00547
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	LEV	DES
ASC		0.000000	0.087080	0.151751
LEV		-0.08708	0.000000	0.064671
DES		-0.15175	-0.06467	0.000000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34380$			
Abs(Dif)-LSD		ASC	LEV	DES
ASC		-0.04543	0.052530	0.104058
LEV		0.052530	-0.01799	0.027193
DES		0.104058	0.027193	-0.04986

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

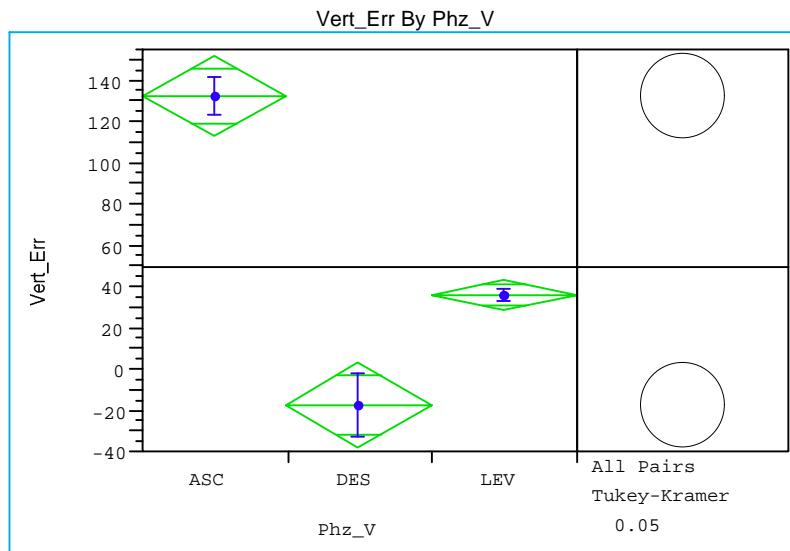
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	4378	0.7705700	0.5427742	0.5422585
DES	3635	0.9995036	0.6452671	0.6443120
LEV	27915	0.9138881	0.6131749	0.6131590

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.6313	2	35925	0.0097
Brown-Forsythe	27.0145	2	35925	<.0001
Levene	27.0044	2	35925	<.0001
Bartlett	142.8342	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
33.6990	2	6783.8	<.0001

Figure A.1- 139 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
ASC	4378	143.422	640.230	9.676
DES	3635	-15.436	944.248	15.662
LEV	27915	43.041	619.130	3.706

Means Comparisons

Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.000	100.381	158.857
LEV	-100.381	0.000	58.476
DES	-158.857	-58.476	0.000

Alpha= 0.05
 Comparisons for all pairs using Tukey-Kramer HSD
 $q^* = 2.34380$

Abs(Dif)-LSD	ASC	LEV	DES
ASC	-33.153	75.167	124.051
LEV	75.167	-13.129	31.125
DES	124.051	31.125	-36.384

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

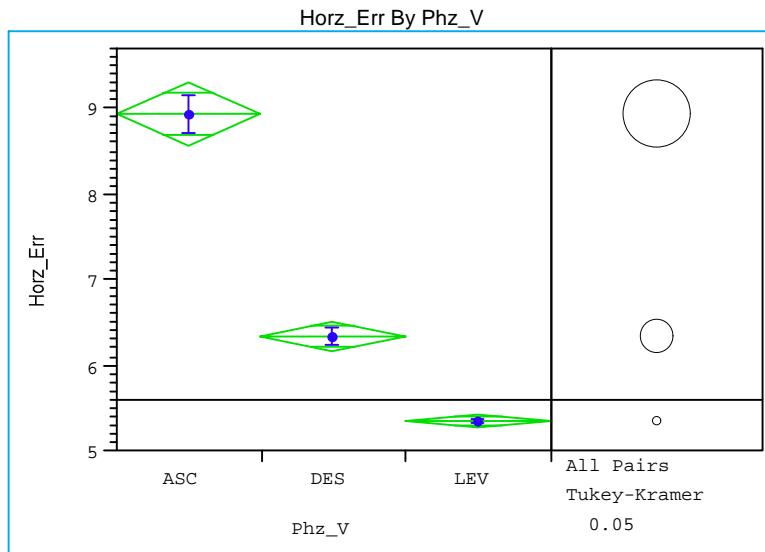
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	4378	640.2296	430.7715	428.1537
DES	3635	944.2478	567.4349	566.3651
LEV	27915	619.1305	147.9035	120.3874

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.6011	2	35925	0.0273
Brown-Forsythe	1193.4789	2	35925	0.0000
Levene	1062.8404	2	35925	0.0000
Bartlett	713.5924	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

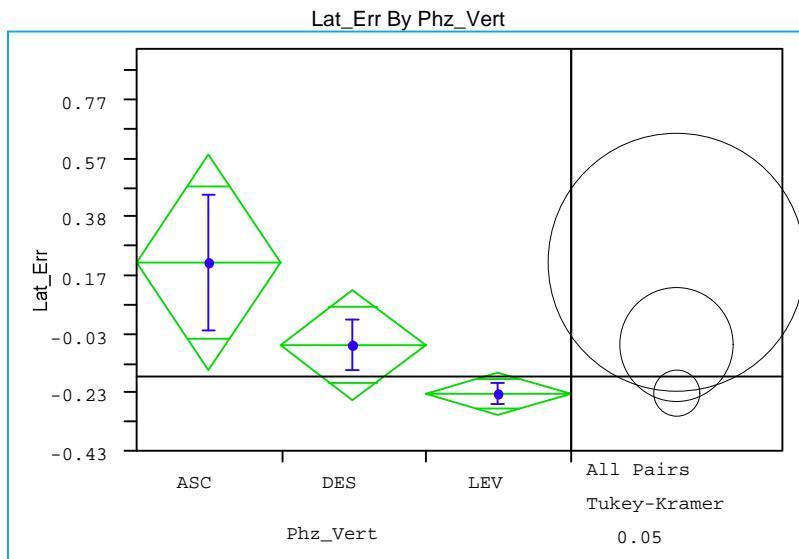
F Ratio	DF Num	DF Den	Prob>F
56.8077	2	6240.5	<.0001

Figure A.1- 140 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



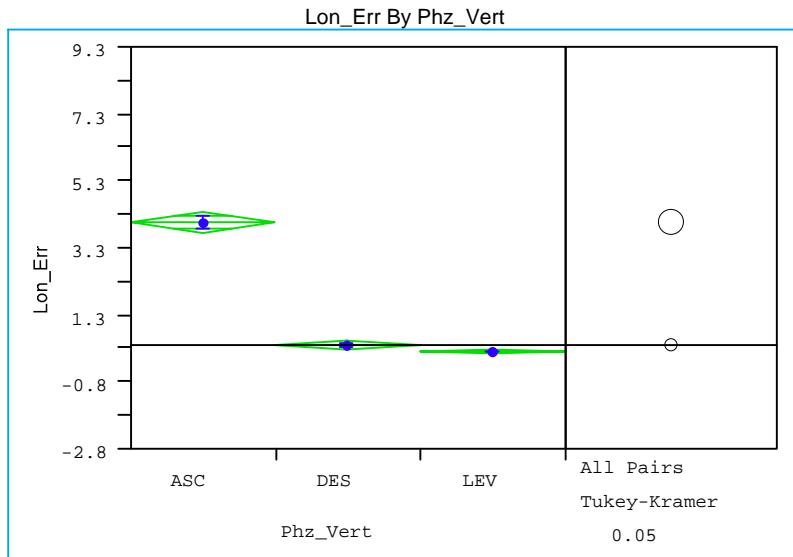
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	818	8.44954	6.42419	0.22462
DES	3082	5.81711	5.62843	0.10138
LEV	20064	4.86284	5.34377	0.03773
Means Comparisons				
Dif=Mean[i]-Mean[j]	ASC	DES	LEV	
ASC	0.00000	2.63244	3.58670	
DES	-2.63244	0.00000	0.95427	
LEV	-3.58670	-0.95427	0.00000	
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34385$			
Abs(Dif)-LSD	ASC	DES	LEV	
ASC	-0.62831	2.13266	3.13345	
DES	2.13266	-0.32369	0.70843	
LEV	3.13345	0.70843	-0.12687	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	818	6.424191	5.046806	4.877465
DES	3082	5.628426	3.789303	3.578561
LEV	20064	5.343766	3.517124	3.210825
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.0840	2	23961	0.1245
Brown-Forsythe	57.8195	2	23961	<.0001
Levene	60.0652	2	23961	<.0001
Bartlett	34.9995	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	155.3402	2	1879.7	<.0001

Figure A.1- 141 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	818	0.248885	6.75532	0.23619	
DES	3082	-0.03138	5.18980	0.09348	
LEV	20064	-0.20943	5.40798	0.03818	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.000000	0.280265	0.458314	
DES		-0.28027	0.000000	0.178049	
LEV		-0.45831	-0.17805	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 2.34385$			
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.62956	-0.2205	0.004166	
DES		-0.2205	-0.32434	-0.06828	
LEV		0.004166	-0.06828	-0.12712	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	818	6.755321	4.029199	4.016305	
DES	3082	5.189798	2.973750	2.972403	
LEV	20064	5.407984	2.824707	2.800483	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		6.3448	2	23961	0.0018
Brown-Forsythe		28.2611	2	23961	<.0001
Levene		27.6353	2	23961	<.0001
Bartlett		51.7520	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	3.1959	2	1888	0.0412	

Figure A.1- 142 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	818	4.10383	7.08477	0.24771
DES	3082	0.45041	6.19604	0.11161
LEV	20064	0.19525	4.78288	0.03377
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	DES	LEV
ASC		0.00000	3.65342	3.90858
DES		-3.65342	0.00000	0.25516
LEV		-3.90858	-0.25516	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34385$			
Abs(Dif)-LSD		ASC	DES	LEV
ASC		-0.58871	3.18515	3.48390
DES		3.18515	-0.30329	0.02482
LEV		3.48390	0.02482	-0.11887

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

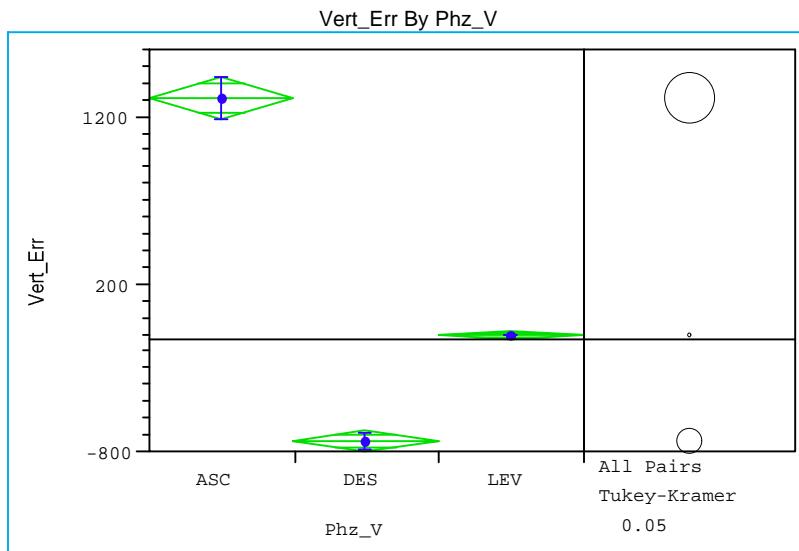
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	818	7.084766	5.387357	5.355981
DES	3082	6.196044	4.048005	4.047764
LEV	20064	4.782883	3.069458	3.069352

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	30.1699	2	23961	<.0001
Brown-Forsythe	209.9188	2	23961	<.0001
Levene	213.9512	2	23961	<.0001
Bartlett	323.5669	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
123.4125	2	1830.1	<.0001

Figure A.1- 143 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	818	1322.70	3799.44	132.84
DES	3082	-726.17	3080.04	55.48
LEV	20064	-93.56	1551.14	10.95

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.00	1416.26	2048.87
LEV	-1416.26	0.00	632.61
DES	-2048.87	-632.61	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34385$	
Abs(Dif)-LSD	
ASC	-223.73
LEV	1254.87
DES	1870.91
	1254.87
	-45.17
	545.07
	545.07
	-115.26

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

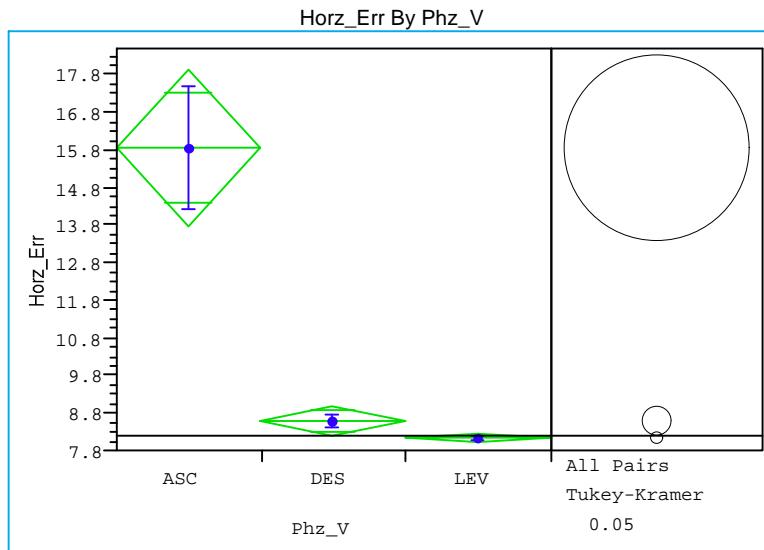
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	818	3799.441	2867.027	2854.848
DES	3082	3080.038	2267.361	2267.097
LEV	20064	1551.141	666.359	610.266

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	615.3838	2	23961	<.0001
Brown-Forsythe	2125.5093	2	23961	0.0000
Levene	2065.6608	2	23961	0.0000
Bartlett	2395.9045	2	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
120.8911	2	1767.1	<.0001

Figure A.1- 144 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	67	15.8809	13.4629	1.6448
DES	1891	8.6502	7.8128	0.1797
LEV	11878	8.1401	8.9953	0.0825

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.00000	7.23073	7.74086
DES	-7.23073	0.00000	0.51013
LEV	-7.74086	-0.51013	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34395$	
Abs(Dif)-LSD	
ASC	-3.59216
DES	4.64608
LEV	5.19366

Positive values show pairs of means that are significantly different.

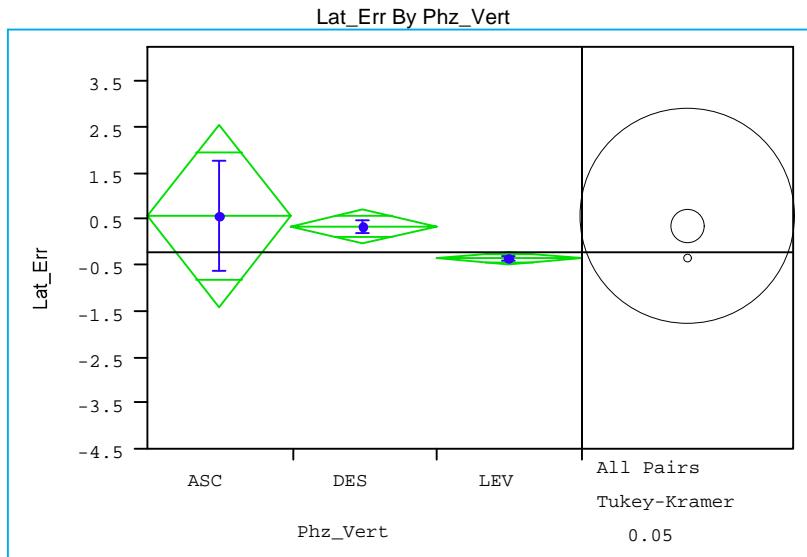
Level	Tests that the Variances are Equal			
	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	67	13.46293	10.10981	9.784099
DES	1891	7.81284	5.60207	5.337903
LEV	11878	8.99532	5.80692	5.348561

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.6157	2	13833	0.0732
Brown-Forsythe	11.6325	2	13833	<.0001
Levene	14.6769	2	13833	<.0001
Bartlett	45.7431	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
14.0737	2	172.57	<.0001

Figure A.1- 145 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	67	0.623984	9.90257	1.2098
DES	1891	0.412936	6.98297	0.1606
LEV	11878	-0.31722	8.59878	0.0789

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.000000	0.211047	0.941200
DES	-0.21105	0.000000	0.730153
LEV	-0.9412	-0.73015	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34395$	
Abs(Dif)-LSD	
ASC	ASC
DES	-2.23756
LEV	-1.47192
	DES
	-0.64057
	0.24248
	LEV
	-0.25559

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

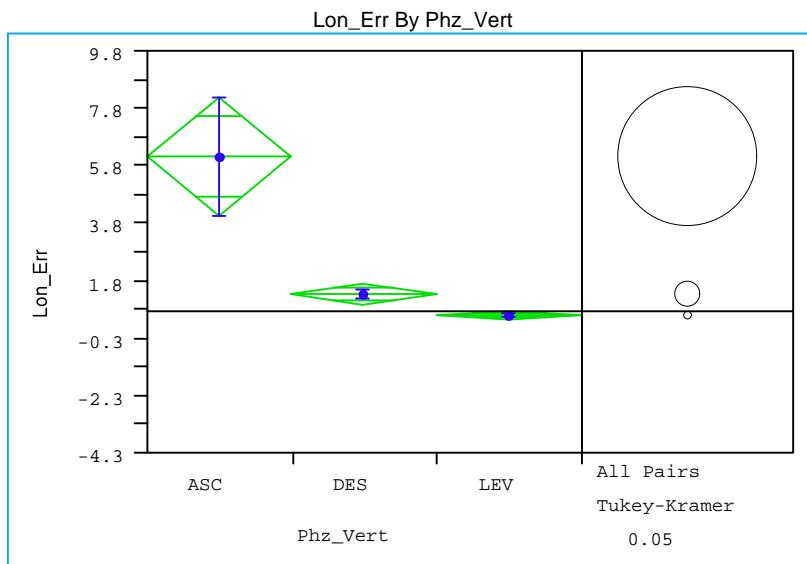
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	67	9.902573	5.255892	5.193390
DES	1891	6.982971	3.893166	3.845981
LEV	11878	8.598785	4.252223	4.200651

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.3091	2	13833	0.0366
Brown-Forsythe	2.5977	2	13833	0.0745
Levene	2.6874	2	13833	0.0681
Bartlett	65.6788	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

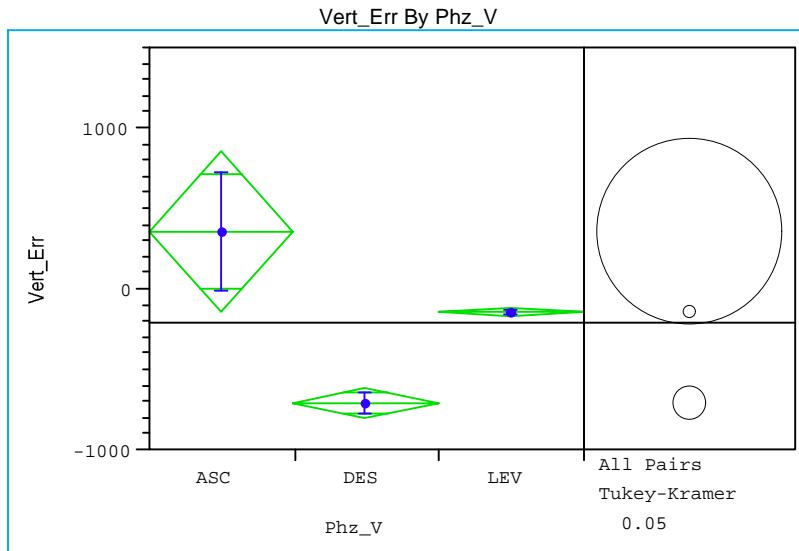
F Ratio	DF Num	DF Den	Prob>F
8.5118	2	173.21	0.0003

Figure A.1- 146 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	67	6.08724	17.3552	2.1203
DES	1891	1.32916	9.2307	0.2123
LEV	11878	0.56313	8.5338	0.0783
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	DES	LEV
ASC		0.00000	4.75808	5.52411
DES		-4.75808	0.00000	0.76602
LEV		-5.52411	-0.76602	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34395$			
Abs(Dif)-LSD		ASC	DES	LEV
ASC		-3.52132	2.22441	3.02715
DES		2.22441	-0.66282	0.26141
LEV		3.02715	0.26141	-0.26447
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	67	17.35519	12.34545	12.34024
DES	1891	9.23068	6.38181	6.37956
LEV	11878	8.53376	5.53675	5.53671
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	18.0889	2	13833	<.0001
Brown-Forsythe	48.1627	2	13833	<.0001
Levene	48.2980	2	13833	<.0001
Bartlett	63.8325	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F

Figure A.1- 147 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	67	366.593	3022.95	369.31
DES	1891	-692.948	3212.21	73.87
LEV	11878	-125.540	1861.58	17.08

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.00	492.13	1059.54
LEV	-492.13	0.00	567.41
DES	-1059.54	-567.41	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34395$	
Abs(Dif)-LSD	ASC
ASC	-852.259
LEV	-112.202
DES	446.319
ASC	LEV
-852.259	-112.202
-112.202	-64.008
446.319	445.276
LEV	DES
-112.202	446.319
-64.008	445.276
445.276	-160.422

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

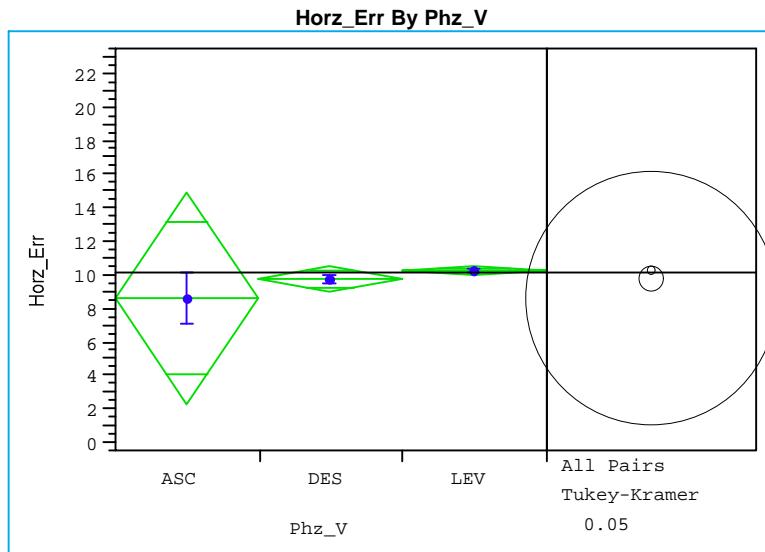
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	67	3022.946	1936.165	1904.832
DES	1891	3212.207	2391.171	2390.027
LEV	11878	1861.579	819.093	744.353

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	63.3912	2	13833	<.0001
Brown-Forsythe	705.9509	2	13833	<.0001
Levene	669.1486	2	13833	<.0001
Bartlett	631.8215	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
28.8846	2	171.3	<.0001

Figure A.1- 148 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	11	8.5964	5.0654	1.5273
DES	781	9.7114	9.3400	0.3342
LEV	5652	10.2329	11.1039	0.1477

Means Comparisons			
Dif=Mean[i]-Mean[j]	LEV	DES	ASC
LEV	0.00000	0.52155	1.63647
DES	-0.52155	0.00000	1.11492
ASC	-1.63647	-1.11492	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34424$	
Abs(Dif)-LSD	
LEV	-0.4806
DES	-0.4538
ASC	-6.0743
LEV	-0.4538
DES	-1.2929
ASC	-6.6424
LEV	-6.6424
DES	-10.8941

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

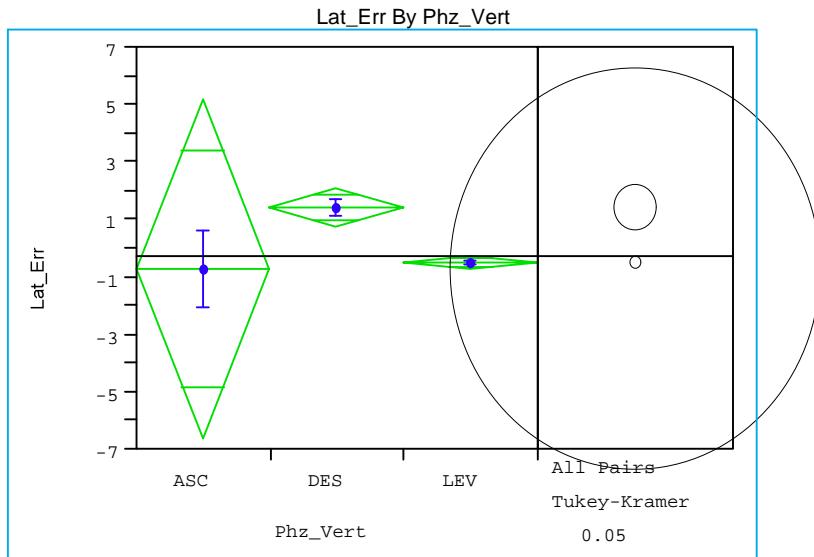
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	11	5.06535	3.624998	3.007345
DES	781	9.34000	6.418944	5.989695
LEV	5652	11.10395	7.102620	6.565134

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.2850	2	6441	0.2767
Brown-Forsythe	2.0928	2	6441	0.1234
Levene	3.2181	2	6441	0.0401
Bartlett	22.1665	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

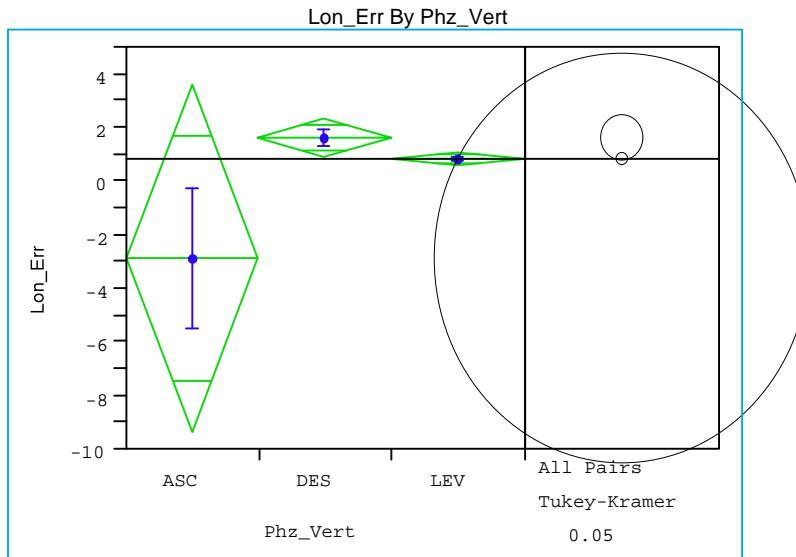
F Ratio	DF Num	DF Den	Prob>F
1.4934	2	26.839	0.2427

Figure A.1- 149 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	11	-0.66729	4.5378	1.3682
DES	781	1.43987	8.5302	0.3052
LEV	5652	-0.45051	10.2374	0.1362
Means Comparisons				
Dif=Mean[i]-Mean[j]		DES	LEV	ASC
DES		0.00000	1.89037	2.10716
LEV		-1.89037	0.00000	0.21678
ASC		-2.10716	-0.21678	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34424$			
Abs(Dif)-LSD		DES	LEV	ASC
DES		-1.1910	0.9919	-5.0388
LEV		0.9919	-0.4427	-6.8863
ASC		-5.0388	-6.8863	-10.0355
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	11	4.53782	2.342874	1.988864
DES	781	8.53021	4.643592	4.332618
LEV	5652	10.23743	4.896145	4.803751
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.0921	2	6441	0.3356
Brown-Forsythe	1.4992	2	6441	0.2234
Levene	0.7367	2	6441	0.4787
Bartlett	24.3585	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	15.6798	2	26.863	<.0001

Figure A.1- 150 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	11	-2.91244	8.7484	2.6377
DES	781	1.57001	10.2156	0.3655
LEV	5652	0.78698	11.0635	0.1472
Means Comparisons				
Dif=Mean[i]-Mean[j]		DES	LEV	ASC
DES		0.00000	0.78303	4.48245
LEV		-0.78303	0.00000	3.69942
ASC		-4.48245	-3.69942	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34424$			
Abs(Dif)-LSD		DES	LEV	ASC
DES		-1.3003	-0.1979	-3.3194
LEV		-0.1979	-0.4834	-4.0556
ASC		-3.3194	-4.0556	-10.9566

Positive values show pairs of means that are significantly different.

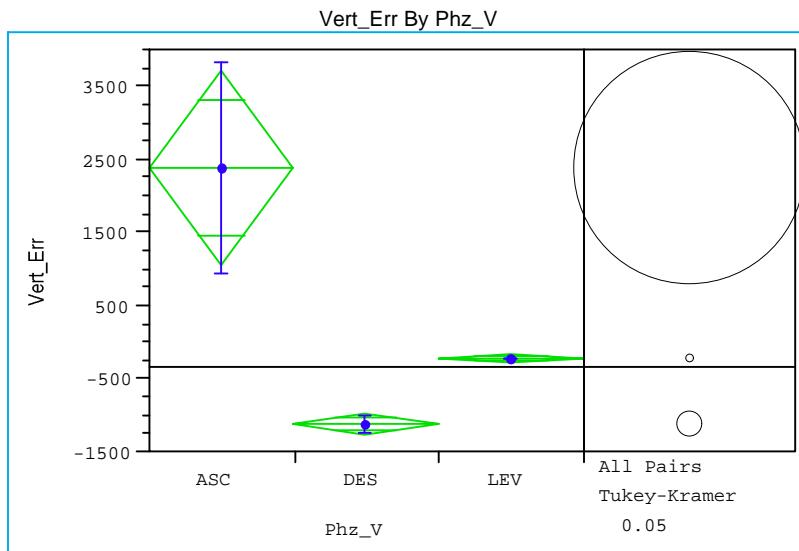
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	11	8.74840	6.867015	6.879182
DES	781	10.21560	7.191399	7.189635
LEV	5652	11.06351	7.398194	7.398110

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.8785	2	6441	0.4155
Brown-Forsythe	0.2470	2	6441	0.7811
Levene	0.2445	2	6441	0.7831
Bartlett	4.5491	2	?	0.0106

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	2.9401	2	26.555	0.0702

Figure A.1- 151 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	11	2367.53	4803.94	1448.4
DES	781	-1135.50	3374.12	120.7
LEV	5652	-220.69	2072.25	27.6

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.00	2588.22	3503.03
LEV	-2588.22	0.00	914.81
DES	-3503.03	-914.81	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34424$	
Abs(Dif)-LSD	ASC
ASC	-2275.47
LEV	977.65
DES	1882.74
ASC	LEV
-2275.47	977.65
977.65	-100.38
1882.74	711.09
LEV	DES
977.65	711.09
-100.38	711.09
711.09	-270.05

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

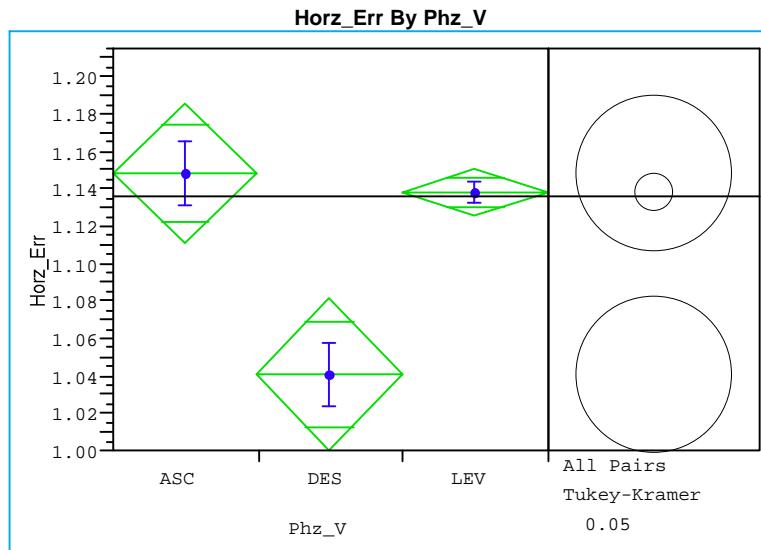
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	11	4803.938	2701.043	2176.435
DES	781	3374.120	2569.823	2568.367
LEV	5652	2072.252	998.330	868.832

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	24.0650	2	6441	<.0001
Brown-Forsythe	265.3004	2	6441	<.0001
Levene	246.0753	2	6441	<.0001
Bartlett	212.9661	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
28.2223	2	26.379	<.0001

Figure A.1- 152 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	2345	1.15130	0.870731	0.01798
DES	2012	1.04303	0.784722	0.01749
LEV	21791	1.14400	0.962867	0.00652

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.000000	0.007301	0.108269
LEV	-0.0073	0.000000	0.100967
DES	-0.10827	-0.10097	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34383$	
Abs(Dif)-LSD	
ASC	-0.0645
LEV	-0.0407
DES	0.041149
	ASC
	LEV
	DES

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

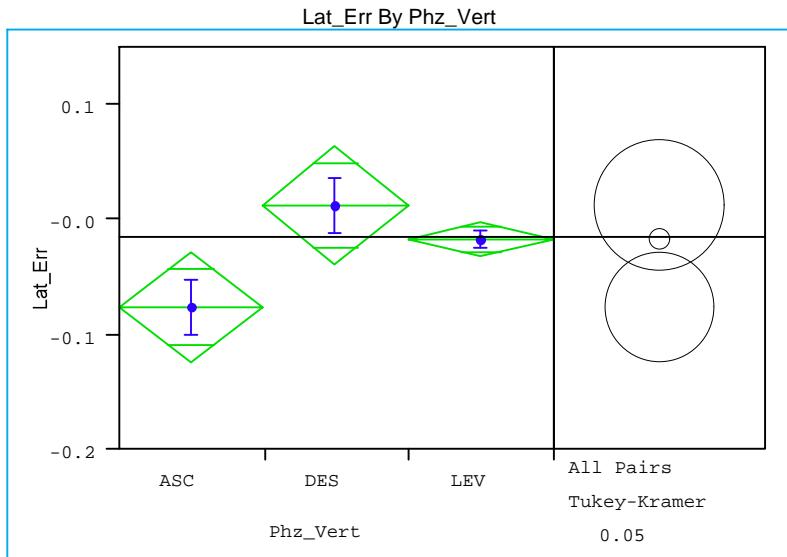
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	2345	0.8707308	0.6552957	0.6368770
DES	2012	0.7847219	0.6138153	0.5928690
LEV	21791	0.9628669	0.6538652	0.6327879

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.7900	2	26145	0.4539
Brown-Forsythe	2.8765	2	26145	0.0563
Levene	3.2358	2	26145	0.0393
Bartlett	84.0044	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

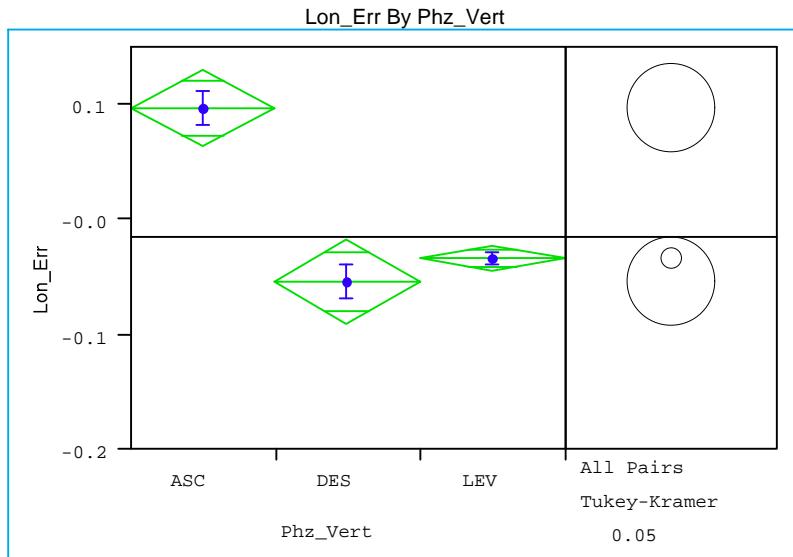
F Ratio	DF Num	DF Den	Prob>F
15.1528	2	3606.9	<.0001

Figure A.1- 153 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	2345	-0.07831	1.21484	0.02509	
DES	2012	0.004360	1.11046	0.02476	
LEV	21791	-0.02187	1.20537	0.00817	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DES	LEV	ASC	
DES		0.000000	0.026231	0.082669	
LEV		-0.02623	0.000000	0.056437	
ASC		-0.08267	-0.05644	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34383$				
Abs(Dif)-LSD		DES	LEV	ASC	
DES		-0.08862	-0.03926	-0.00274	
LEV		-0.03926	-0.02693	-0.00465	
ASC		-0.00274	-0.00465	-0.08208	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	2345	1.214843	0.8550664	0.8544570	
DES	2012	1.110456	0.7525471	0.7524417	
LEV	21791	1.205367	0.8030197	0.8025734	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		0.8467	2	26145	0.4288
Brown-Forsythe		7.1615	2	26145	0.0008
Levene		7.2410	2	26145	0.0007
Bartlett		12.2711	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	3.0310	2	3467.4	0.0484	

Figure A.1- 154 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	2345	0.090018	0.770811	0.01592
DES	2012	-0.05311	0.684320	0.01526
LEV	21791	-0.03422	0.883940	0.00599

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.000000	0.124241	0.143130
LEV	-0.12424	0.000000	0.018889
DES	-0.14313	-0.01889	0.000000

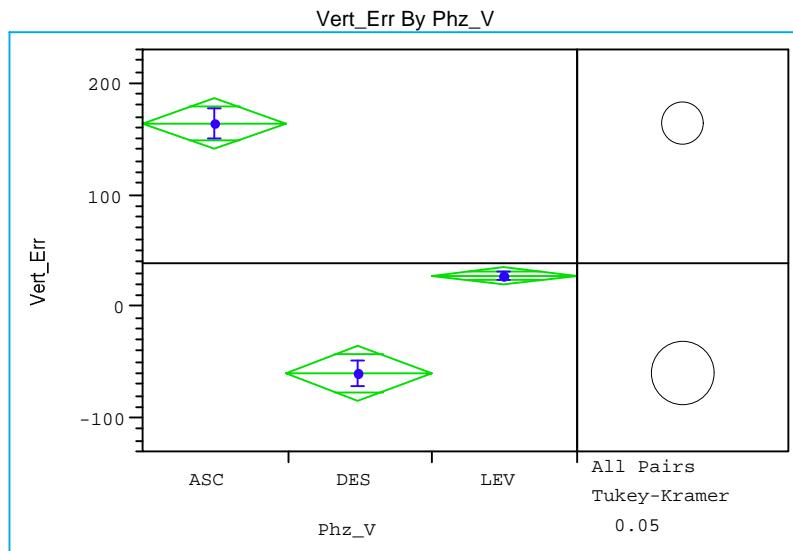
Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34383$	
Abs(Dif)-LSD	
ASC	-0.0589
LEV	0.080407
DES	0.081839

Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	2345	0.7708108	0.5525002	0.5517916
DES	2012	0.6843200	0.5256625	0.5251193
LEV	21791	0.8839398	0.6007800	0.6007332

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.6021	2	26145	0.0741
Brown-Forsythe	18.3921	2	26145	<.0001
Levene	18.0895	2	26145	<.0001
Bartlett	133.5388	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	28.9052	2	3668.4	<.0001

Figure A.1- 155 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	2345	164.895	689.815	14.245
DES	2012	-54.944	548.348	12.225
LEV	21791	33.862	582.105	3.943

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.000	131.034	219.839
LEV	-131.034	0.000	88.805
DES	-219.839	-88.805	0.000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34383$	
Abs(Dif)-LSD	ASC
ASC	-40.391
LEV	100.976
DES	177.810
Abs(Dif)-LSD	LEV
ASC	100.976
LEV	-13.250
DES	56.580
Abs(Dif)-LSD	DES
ASC	177.810
LEV	56.580
DES	-43.605

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

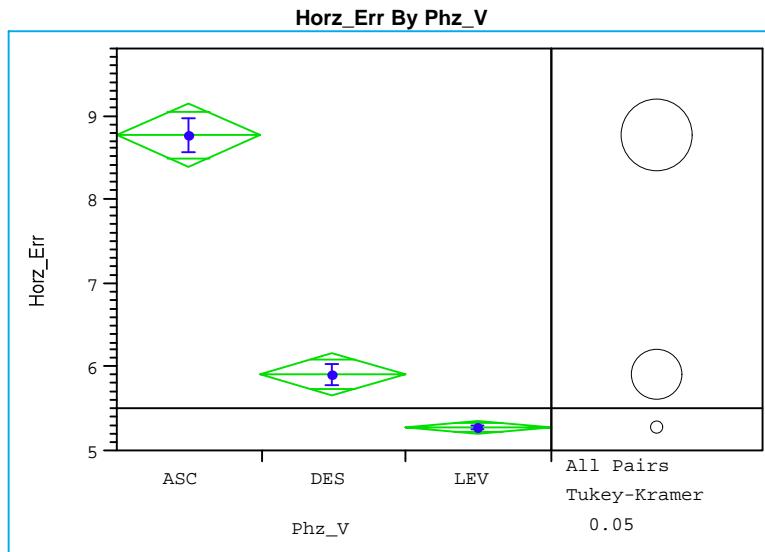
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	2345	689.8154	427.7717	425.2546
DES	2012	548.3482	409.4158	409.4063
LEV	21791	582.1048	104.2496	79.2132

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.1437	2	26145	0.8661
Brown-Forsythe	661.5128	2	26145	<.0001
Levene	582.1952	2	26145	<.0001
Bartlett	77.9068	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
68.6614	2	3385.8	<.0001

Figure A.1- 156 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	790	8.50273	6.35945	0.22626
DES	1599	5.64080	5.70905	0.14277
LEV	15821	5.01378	5.61371	0.04463

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.00000	2.86194	3.48895
DES	-2.86194	0.00000	0.62701
LEV	-3.48895	-0.62701	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34389$	
Abs(Dif)-LSD	
ASC	-0.66709
DES	2.28537
LEV	3.00561
ASC	2.28537
DES	-0.46889
LEV	0.27911
ASC	3.00561
DES	-0.14907
LEV	-0.14907

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

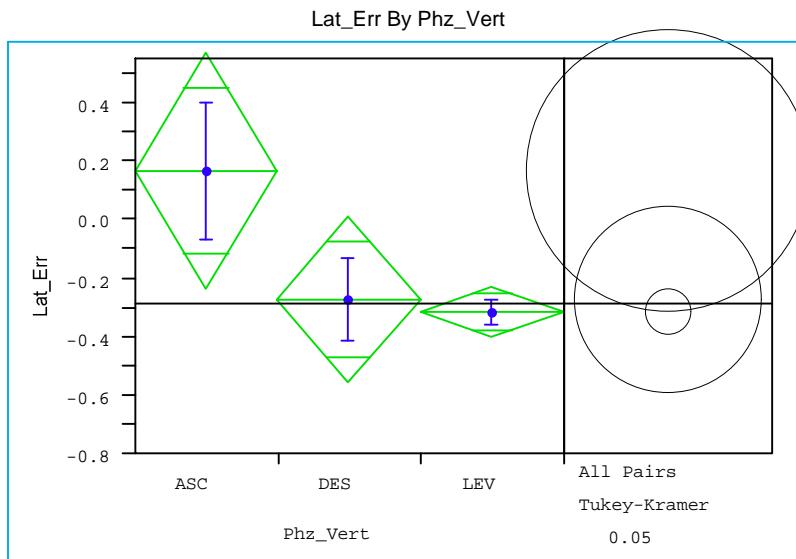
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	790	6.359453	5.014433	4.848607
DES	1599	5.709050	3.981934	3.676897
LEV	15821	5.613709	3.684837	3.350665

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.7348	2	18207	0.4796
Brown-Forsythe	38.5177	2	18207	<.0001
Levene	39.7989	2	18207	<.0001
Bartlett	12.7644	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
119.9102	2	1563.2	<.0001

Figure A.1- 157 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	790	0.229566	6.73511	0.23962
DES	1599	-0.18682	5.73576	0.14344
LEV	15821	-0.26056	5.77479	0.04591

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.000000	0.416381	0.490126
DES	-0.41638	0.000000	0.073745
LEV	-0.49013	-0.07375	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34389$	
Abs(Dif)-LSD	
ASC	0.68594
DES	-0.17648
LEV	-0.00687
ASC	-0.17648
DES	-0.48214
LEV	-0.284
ASC	-0.284
DES	-0.15328

Positive values show pairs of means that are significantly different.

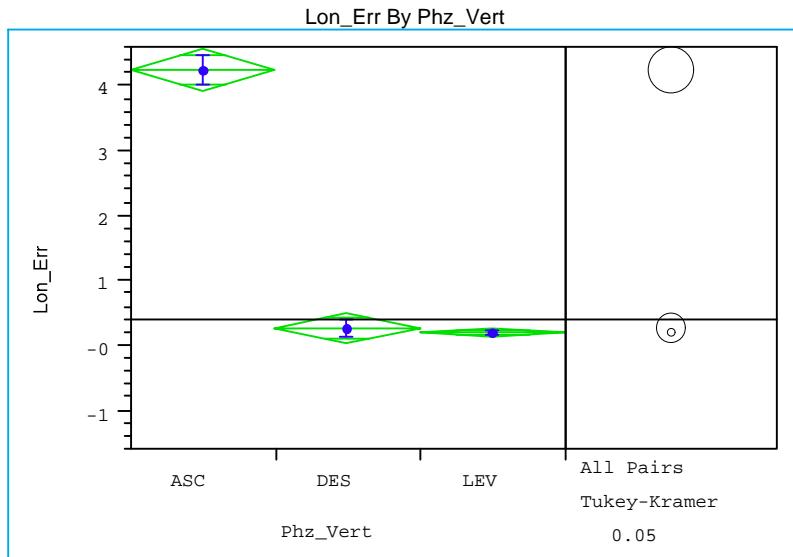
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	790	6.735109	4.017441	4.005424
DES	1599	5.735762	3.189536	3.171637
LEV	15821	5.774790	3.036701	2.999845

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.3574	2	18207	0.0947
Brown-Forsythe	15.9928	2	18207	<.0001
Levene	15.2786	2	18207	<.0001
Bartlett	19.8710	2	?	<.0001

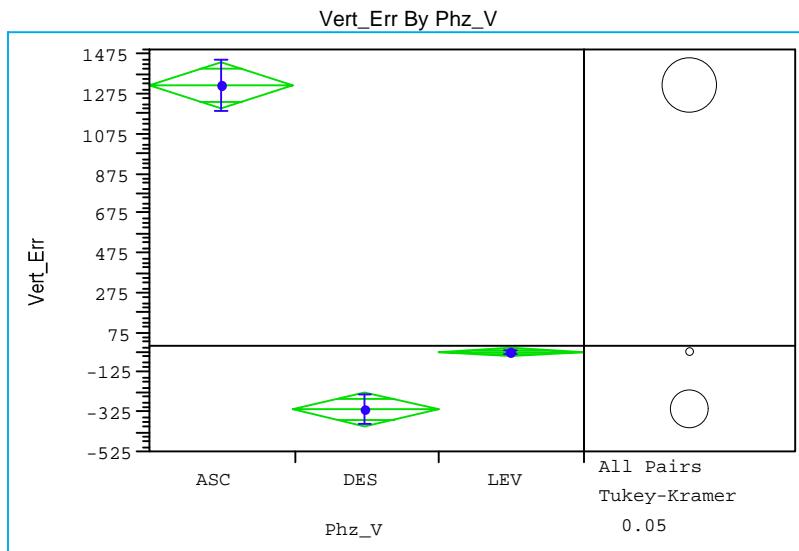
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	2.0872	2	1562.8	0.1244

Figure A.1- 158 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



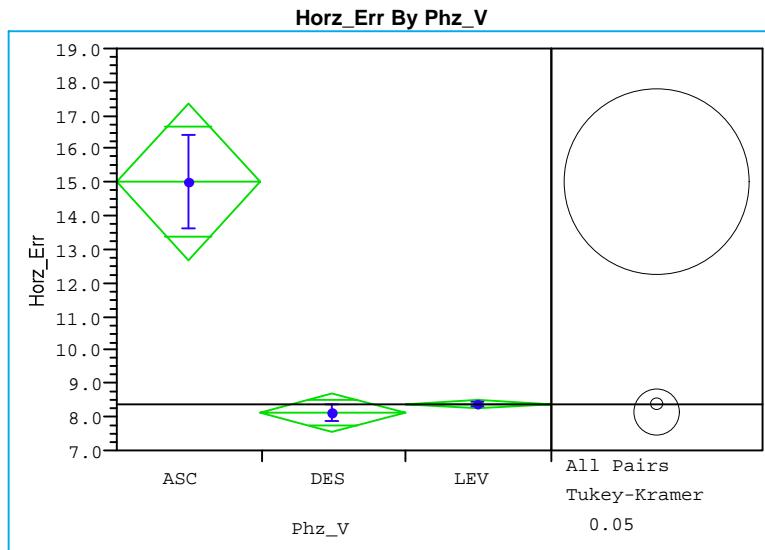
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	790	4.26534	7.01428	0.24956	
DES	1599	0.28032	5.60529	0.14018	
LEV	15821	0.21882	4.81553	0.03828	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.00000	3.98502	4.04652	
DES		-3.98502	0.00000	0.06149	
LEV		-4.04652	-0.06149	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34389$				
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.59013	3.47497	3.61894	
DES		3.47497	-0.41480	-0.24628	
LEV		3.61894	-0.24628	-0.13187	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	790	7.014278	5.380801	5.350096	
DES	1599	5.605288	3.669638	3.663329	
LEV	15821	4.815533	3.053748	3.052405	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		15.3261	2	18207	<.0001
Brown-Forsythe		149.0593	2	18207	<.0001
Levene		153.3746	2	18207	<.0001
Bartlett		159.0890	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	128.4044	2	1517	<.0001	

Figure A.1- 159 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	790	1329.85	3826.34	136.14	
DES	1599	-307.77	3063.43	76.61	
LEV	15821	-20.23	1426.57	11.34	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00	1350.08	1637.62	
LEV		-1350.08	0.00	287.54	
DES		-1637.62	-287.54	0.00	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34389$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-211.84	1196.59	1454.53	
LEV		1196.59	-47.34	177.06	
DES		1454.53	177.06	-148.90	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	790	3826.340	2892.154	2878.453	
DES	1599	3063.425	2243.293	2223.390	
LEV	15821	1426.566	520.903	507.304	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		500.6528	2	18207	<.0001
Brown-Forsythe		1794.4347	2	18207	0.0000
Levene		1832.2859	2	18207	0.0000
Bartlett		2194.7295	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	56.1576	2	1441.6	<.0001	

Figure A.1- 160 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	60	15.1133	11.1476	1.4391
DES	954	8.1625	8.1071	0.2625
LEV	9360	8.4334	9.4055	0.0972

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.00000	6.67988	6.95079
LEV	-6.67988	0.00000	0.27090
DES	-6.95079	-0.27090	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34404$	
Abs(Dif)-LSD	
ASC	-3.98207
LEV	3.85512
DES	4.04784
ASC	3.85512
LEV	-0.31882
DES	-0.47036
ASC	4.04784
LEV	-0.47036
DES	-0.99864

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

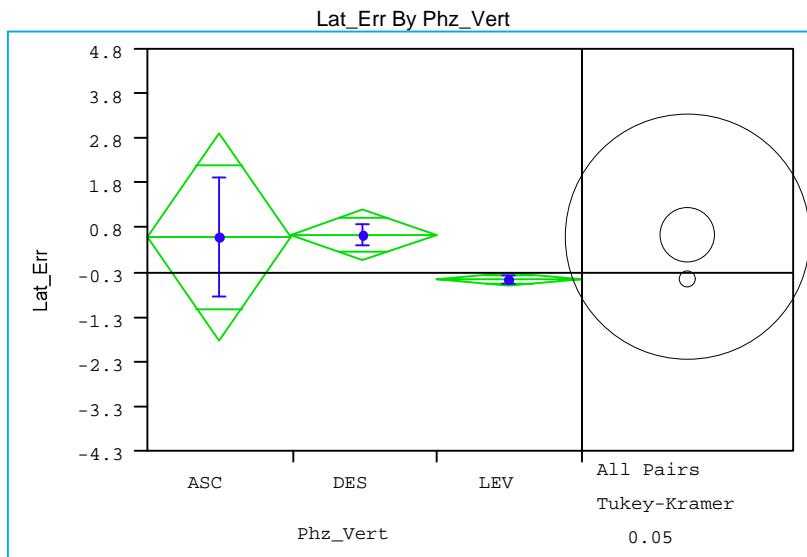
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	60	11.14761	8.926659	8.792062
DES	954	8.10711	5.683671	5.332744
LEV	9360	9.40554	6.027817	5.546812

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.8049	2	10371	0.4472
Brown-Forsythe	5.3426	2	10371	0.0048
Levene	6.1057	2	10371	0.0022
Bartlett	19.7546	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

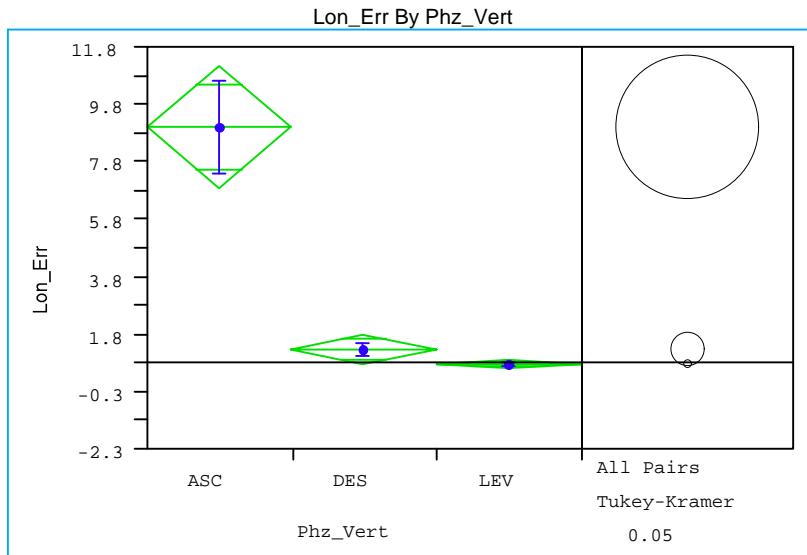
F Ratio	DF Num	DF Den	Prob>F
11.2529	2	151.28	<.0001

Figure A.1- 161 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	60	0.544405	10.3652	1.3381
DES	954	0.639600	7.8553	0.2543
LEV	9360	-0.36263	9.2916	0.0960
Means Comparisons				
Dif=Mean[i]-Mean[j]		DES	ASC	LEV
DES		0.00000	0.09520	1.00223
ASC		-0.09520	0.00000	0.90704
LEV		-1.00223	-0.90704	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34404$			
Abs(Dif)-LSD		DES	ASC	LEV
DES		-0.98478	-2.76745	0.27126
ASC		-2.76745	-3.92679	-1.87851
LEV		0.27126	-1.87851	-0.31439
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	60	10.36523	5.448780	5.400325
DES	954	7.85527	4.379056	4.274972
LEV	9360	9.29163	4.686891	4.621213
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.3199	2	10371	0.2672
Brown-Forsythe	1.1313	2	10371	0.3226
Levene	0.9555	2	10371	0.3846
Bartlett	23.1685	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob>F	
6.9352	2	151.48	0.0013	

Figure A.1- 162 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	60	8.98926	12.9088	1.6665
DES	954	1.25311	8.2907	0.2684
LEV	9360	0.69940	8.5229	0.0881
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	DES	LEV
ASC		0.00000	7.73615	8.28985
DES		-7.73615	0.00000	0.55371
LEV		-8.28985	-0.55371	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34404$			
Abs(Dif)-LSD		ASC	DES	LEV
ASC		-3.65187	5.07392	5.69933
DES		5.07392	-0.91583	-0.12609
LEV		5.69933	-0.12609	-0.29238

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

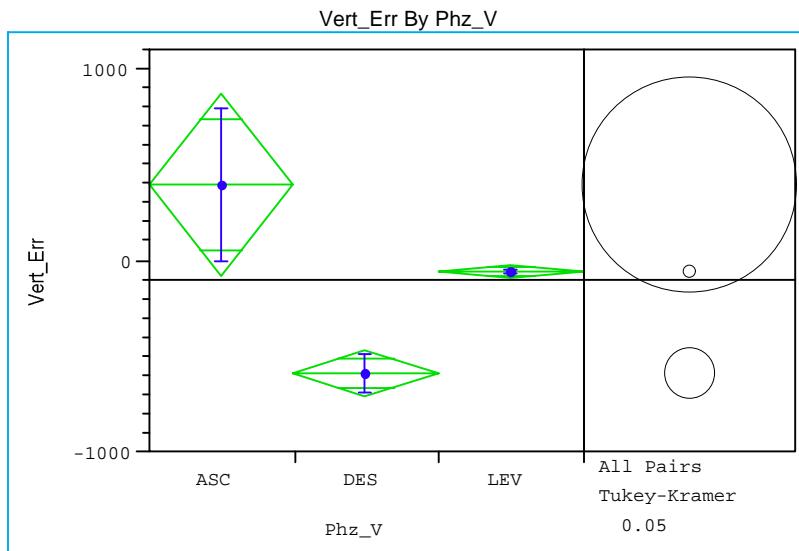
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	60	12.90878	10.76249	10.68907
DES	954	8.29067	5.49484	5.49171
LEV	9360	8.52287	5.51051	5.50763

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.3405	2	10371	0.0963
Brown-Forsythe	19.0557	2	10371	<.0001
Levene	19.6194	2	10371	<.0001
Bartlett	14.3354	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
14.0398	2	150.48	<.0001

Figure A.1- 163 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	60	393.245	3155.29	407.35
DES	954	-580.416	3150.19	101.99
LEV	9360	-57.599	1735.54	17.94

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.000	450.844	973.661
LEV	-450.844	0.000	522.817
DES	-973.661	-522.817	0.000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34404$	
Abs(Dif)-LSD	
ASC	-821.719
LEV	-132.059
DES	374.624
	-132.059
	369.854
	-206.075

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

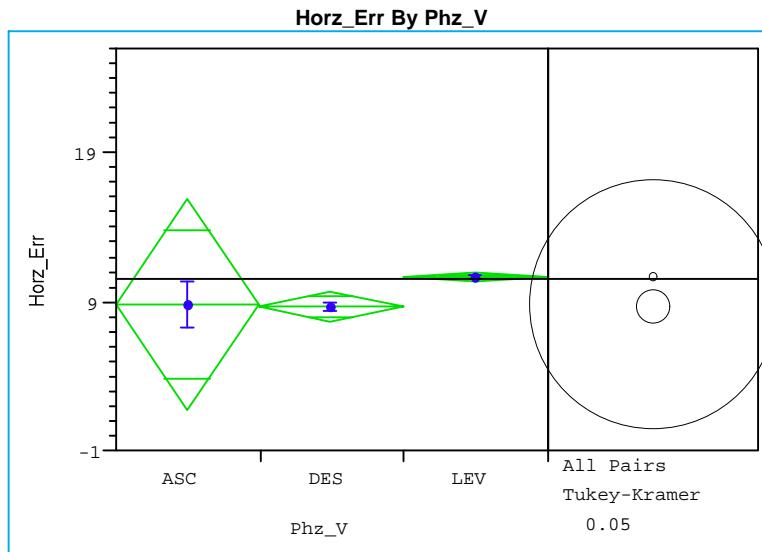
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	60	3155.288	2032.020	1986.479
DES	954	3150.193	2296.068	2290.300
LEV	9360	1735.538	640.975	603.384

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	29.8949	2	10371	<.0001
Brown-Forsythe	446.4619	2	10371	<.0001
Levene	438.7175	2	10371	<.0001
Bartlett	443.2608	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
13.3392	2	149.2	<.0001

Figure A.1- 164 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	10	8.8798	5.2467	1.6591
DES	435	8.6888	8.4504	0.4052
LEV	4446	10.8108	11.8025	0.1770

Means Comparisons			
Dif=Mean[i]-Mean[j]	LEV	ASC	DES
LEV	0.00000	1.93105	2.12201
ASC	-1.93105	0.00000	0.19096
DES	-2.12201	-0.19096	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34442$	
Abs(Dif)-LSD	
LEV	-0.5736
ASC	-6.6305
DES	0.7634
LEV	-6.6305
ASC	-12.0943
DES	-8.4588
LEV	-8.4588
ASC	-1.8337

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

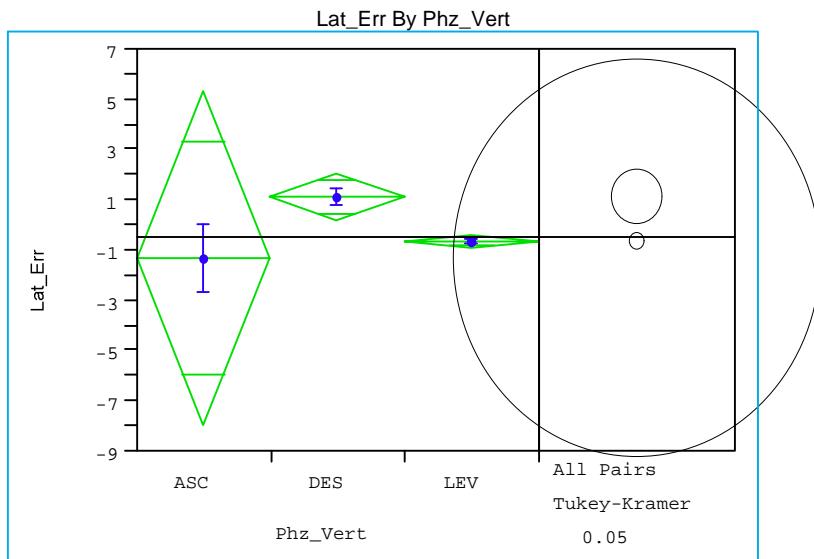
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	10	5.24666	3.817498	3.166610
DES	435	8.45044	5.712232	5.272187
LEV	4446	11.80248	7.524539	6.968179

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.0195	2	4888	0.1328
Brown-Forsythe	6.5529	2	4888	0.0014
Levene	9.0729	2	4888	0.0001
Bartlett	39.6519	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

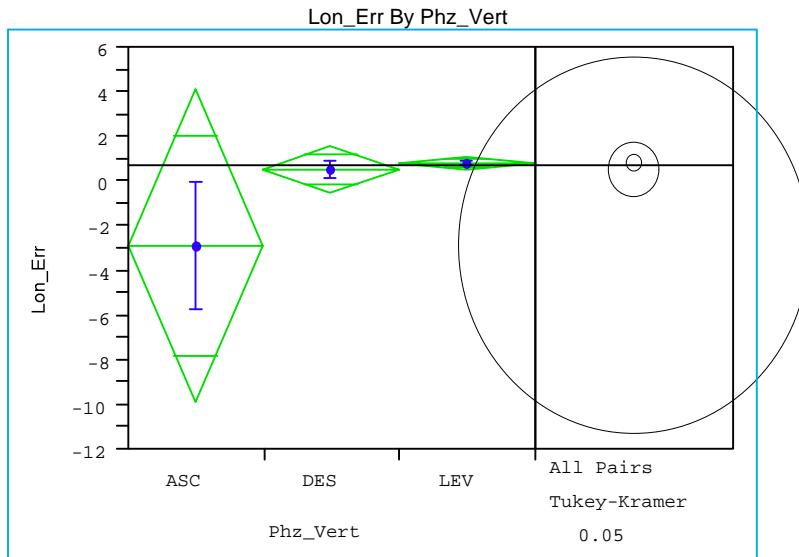
F Ratio	DF Num	DF Den	Prob>F
11.6500	2	24.099	0.0003

Figure A.1- 165 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	10	-1.23892	4.3458	1.3743	
DES	435	1.16046	7.5323	0.3611	
LEV	4446	-0.59905	11.0126	0.1652	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DES	LEV	ASC	
DES		0.00000	1.75951	2.39938	
LEV		-1.75951	0.00000	0.63987	
ASC		-2.39938	-0.63987	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34442$				
Abs(Dif)-LSD		DES	LEV	ASC	
DES		-1.7074	0.4945	-5.6543	
LEV		0.4945	-0.5341	-7.3317	
ASC		-5.6543	-7.3317	-11.2609	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	10	4.34581	2.462836	1.686380	
DES	435	7.53227	4.073409	3.830838	
LEV	4446	11.01258	5.357557	5.209377	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		1.9542	2	4888	0.1418
Brown-Forsythe		4.8354	2	4888	0.0080
Levene		4.1621	2	4888	0.0156
Bartlett		49.9821	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	9.7795	2	24.222	0.0008	

Figure A.1- 166 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	10	-2.92582	9.2215	2.9161
DES	435	0.54567	9.4178	0.4516
LEV	4446	0.80756	11.5720	0.1735

Means Comparisons			
Dif=Mean[i]-Mean[j]	LEV	DES	ASC
LEV	0.00000	0.26189	3.73338
DES	-0.26189	0.00000	3.47149
ASC	-3.73338	-3.47149	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34442$	
Abs(Dif)-LSD	
LEV	
DES	
ASC	

Abs(Dif)-LSD	LEV	DES	ASC
LEV	-0.5665	-1.0800	-4.7227
DES	-1.0800	-1.8111	-5.0717
ASC	-4.7227	-5.0717	-11.9453

Positive values show pairs of means that are significantly different.

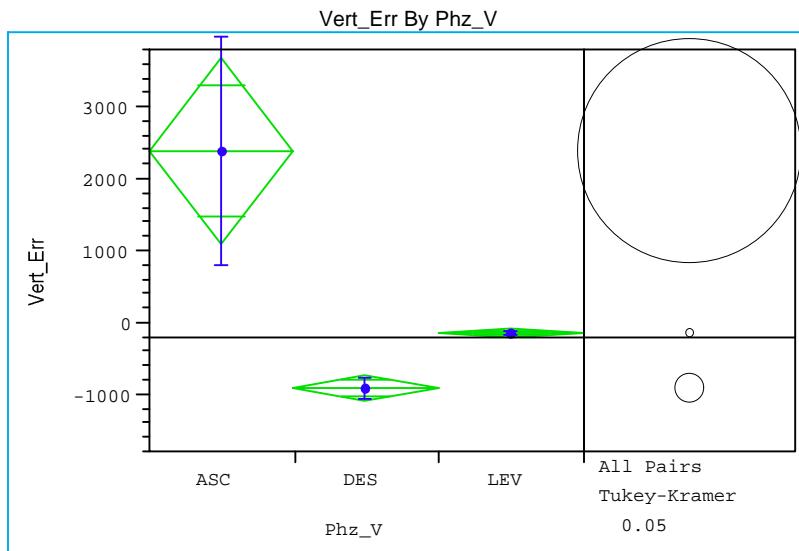
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	10	9.22151	7.537656	7.346080
DES	435	9.41785	6.429918	6.428583
LEV	4446	11.57197	7.704713	7.703998

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.4490	2	4888	0.0865
Brown-Forsythe	4.4769	2	4888	0.0114
Levene	4.4709	2	4888	0.0115
Bartlett	15.0694	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	0.9230	2	23.771	0.4111

Figure A.1- 167 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	10	2414.28	5061.16	1600.5
DES	435	-891.51	3299.07	158.2
LEV	4446	-116.41	1966.69	29.5

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	LEV	DES
ASC	0.00	2530.69	3305.79
LEV	-2530.69	0.00	775.10
DES	-3305.79	-775.10	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34442$	
Abs(Dif)-LSD	ASC
ASC	-2231.72
LEV	950.85
DES	1709.69
	LEV
	DES
	1709.69
	524.40
	-338.37

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	10	5061.157	2952.446	2267.479
DES	435	3299.071	2467.997	2467.877
LEV	4446	1966.689	795.071	721.228

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	12.7046	2	4888	<.0001
Brown-Forsythe	174.2590	2	4888	<.0001
Levene	169.1966	2	4888	<.0001
Bartlett	150.7959	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
12.5235	2	23.559	0.0002

Figure A.1- 168 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.2 CTAS

A.2.1 Look Ahead Time

A.2.1.1 Summary Tables

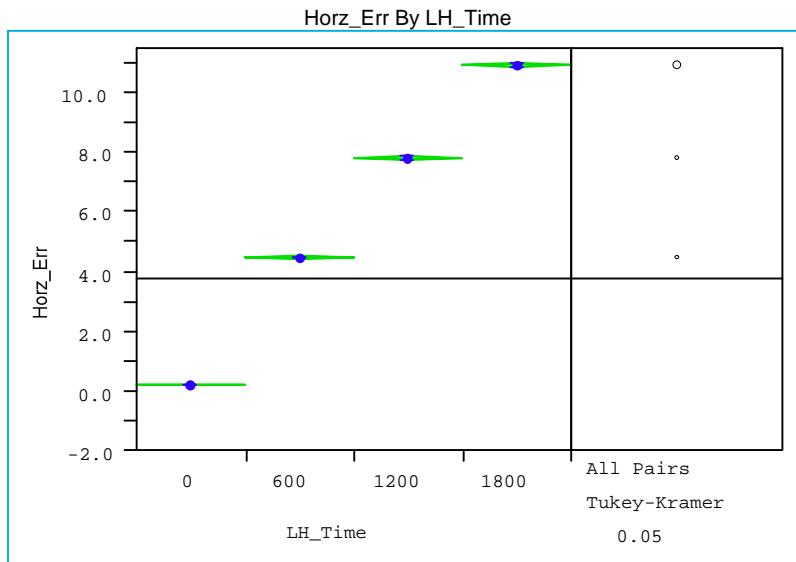
Look Ahead Time (sec)	0	300	600	900	1200	1500	1800
Sample Quantity	32609	27163	21908	16941	12921	9261	6657
Avg. Horz. Error	0.28	2.64	4.53	6.21	7.82	9.4	10.94
Stddev. Horz. Error	0.85	3.19	4.95	6.56	8.12	9.76	11.22
Max. Horz. Error	48.02	88.45	67.08	101.09	103.04	94.14	98.82
Min. Horz. Error	0	0	0.01	0.01	0.01	0.03	0.03
Avg. Lat. Error	0	0.03	0.24	0.46	0.56	0.46	0.46
Stddev. Lat. Error	0.45	3.3	5.03	6.33	7.46	8.55	9.39
Max. Lat. Error	22.88	46.61	55.5	60.84	76.1	85.67	86.54
Min. Lat. Error	-15.57	-46.12	-38.27	-64.27	-55.56	-65.63	-62.21
Avg. Abs. Lat. Error	0.13	1.73	2.66	3.33	3.92	4.42	4.87
Stddev. Abs. Lat. Error	0.44	2.81	4.28	5.41	6.37	7.34	8.05
Max. Abs. Lat. Error	22.88	46.61	55.5	64.27	76.1	85.67	86.54
Min. Abs. Lat. Error	0	0	0	0	0	0	0
Avg. Long. Error	-0.05	-0.06	0.29	0.64	1.19	1.86	2.43
Stddev. Long. Error	0.77	2.5	4.43	6.39	8.35	10.34	12.3
Max. Long. Error	47.54	46.01	59.63	58.31	77.59	94.14	96.86
Min. Long. Error	-31.16	-87.99	-59.56	-83.04	-94.35	-73.71	-78.6
Avg. Abs. Long. Error	0.21	1.48	2.83	4.14	5.46	6.79	8.13
Stddev. Abs. Long. Error	0.74	2.01	3.42	4.92	6.43	8.01	9.54
Max. Abs. Long. Error	47.54	87.99	59.63	83.04	94.35	94.14	96.86
Min. Abs. Long. Error	0	0	0	0	0	0	0
Avg. Vert. Error	-98.82	-527.89	-759.82	-912.93	-1053.07	-1151.01	-1266.59
Stddev. Vert. Error	789.35	2159.92	2844.69	3359.14	3580.43	3697.21	3868.81
Max. Vert. Error	18889	27290	28990	29003	29003	29003	29003
Min. Vert. Error	-31466.5	-24677	-26868	-32426	-28868	-27901	-29635
Avg. Abs. Vert. Error	154	1061.62	1503.76	1785.4	1940.87	2028.25	2163.38
Stddev. Abs. Vert. Error	780.46	1953.68	2531.44	2988.23	3187.68	3298.5	3448.37
Max. Abs. Vert. Error	31466.46	27290	28990	32426	29003	29003	29635
Min. Abs. Vert. Error	0	0	0	0	0	0	0
Avg. Slant Range Error	0.28	2.67	4.56	6.25	7.86	9.44	10.98
Stddev. Slant Range Error	0.86	3.19	4.95	6.55	8.1	9.74	11.2
Max. Slant Range Error	48.03	88.56	67.09	101.09	103.05	94.14	98.82
Min. Slant Range Error	0	0.01	0.01	0.01	0.01	0.03	0.03

Figure A.2- 1 Descriptive Statistics for Look Ahead Times 0 to 1800 Seconds from All Samples

Look Ahead Time (sec)	0	300	600	900	1200	1500	1800
Sample Quantity	21209	18451	14807	11217	8189	5705	3917
Avg. Horz. Error	0.25	2.5	4.41	6.13	7.79	9.13	10.34
Stddev. Horz. Error	0.75	3.31	5.16	6.77	8.43	9.83	11.08
Max. Horz. Error	48.02	88.45	67.08	75.25	86.73	87.22	87.65
Min. Horz. Error	0	0	0.01	0.01	0.01	0.03	0.03
Avg. Lat. Error	0	0.06	0.33	0.66	0.86	0.76	0.71
Stddev. Lat. Error	0.41	3.46	5.36	6.9	8.25	9.49	10.33
Max. Lat. Error	22.88	46.61	55.5	60.84	76.1	85.67	86.54
Min. Lat. Error	-15.57	-46.12	-38.27	-43.96	-55.56	-65.63	-62.21
Avg. Abs. Lat. Error	0.11	1.71	2.72	3.54	4.27	4.82	5.24
Stddev. Abs. Lat. Error	0.4	3.01	4.63	5.96	7.11	8.21	8.93
Max. Abs. Lat. Error	22.88	46.61	55.5	60.84	76.1	85.67	86.54
Min. Abs. Lat. Error	0	0	0	0	0	0	0
Avg. Long. Error	-0.04	0.04	0.31	0.43	0.7	0.8	0.84
Stddev. Long. Error	0.68	2.3	4.13	5.92	7.9	9.42	11.05
Max. Long. Error	47.54	46.01	59.63	58.31	77.59	63.91	77.47
Min. Long. Error	-31.16	-87.99	-29.72	-61.99	-85.87	-61.99	-58.65
Avg. Abs. Long. Error	0.19	1.32	2.6	3.8	5.06	6.09	7.06
Stddev. Abs. Long. Error	0.65	1.88	3.23	4.56	6.11	7.23	8.54
Max. Abs. Long. Error	47.54	87.99	59.63	61.99	85.87	63.91	77.47
Min. Abs. Long. Error	0	0	0	0	0	0	0
Avg. Vert. Error	-17.45	-143.41	-284.9	-267.38	-201.11	-180.72	-128.9
Stddev. Vert. Error	499.6	1778.12	2594.45	3017.1	3061.06	2990.64	3058.47
Max. Vert. Error	18889	27290	28990	29003	29003	29003	29003
Min. Vert. Error	-21500	-18228	-16708	-20550	-19633	-20550	-17851
Avg. Abs. Vert. Error	72.4	734.83	1177.4	1348.57	1343.89	1321.91	1359.03
Stddev. Abs. Vert. Error	494.63	1625.5	2329.37	2712.11	2757.59	2688.66	2742.89
Max. Abs. Vert. Error	21500	27290	28990	29003	29003	29003	29003
Min. Abs. Vert. Error	0	0	0	0	0	0	0
Avg. Slant Range Error	0.25	2.52	4.44	6.16	7.82	9.16	10.36
Stddev. Slant Range Error	0.76	3.31	5.15	6.76	8.42	9.82	11.08
Max. Slant Range Error	48.03	88.56	67.09	75.4	86.86	87.23	87.65
Min. Slant Range Error	0	0.01	0.01	0.01	0.01	0.03	0.03

Figure A.2- 2 Descriptive Statistics for Look Ahead Times 0 to 1800 Seconds from Samples at Altitudes Above 18,000 Feet

A.2.1.2 Statistical Tests



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	32609	0.2754	0.8489	0.00470
600	21908	4.5288	4.9547	0.03347
1200	12921	7.8219	8.1156	0.07140
1800	6657	10.9415	11.2172	0.13748

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.0000	3.1195	6.4127	10.6661
1200	-3.1195	0.0000	3.2932	7.5466
600	-6.4127	-3.2932	0.0000	4.2534
0	-10.6661	-7.5466	-4.2534	0.0000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	1800	1200	600	0
1800	-0.2454	2.9059	6.2146	10.4757
1200	2.9059	-0.1761	3.1361	7.3994
600	6.2146	3.1361	-0.1353	4.1298
0	10.4757	7.3994	4.1298	-0.1109

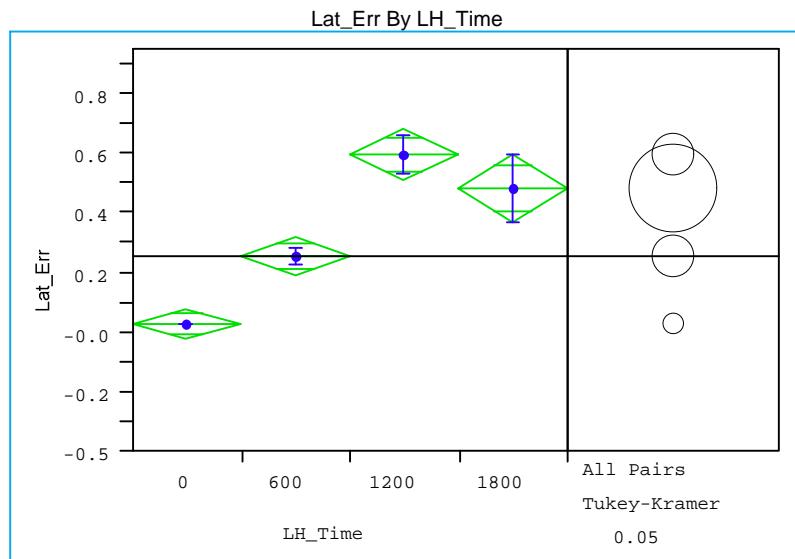
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	32609	0.84893	0.248551	0.204254
600	21908	4.95467	3.452990	3.165135
1200	12921	8.11562	5.811963	5.382548
1800	6657	11.21723	8.211165	7.559329

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1441.7847	3	74091	0.0000
Brown-Forsythe	7351.5399	3	74091	0.0000
Levene	11959.587	3	74091	0.0000
Bartlett	35722.914	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	10866.429	3	18479	0.0000

Figure A.2- 3 Statistical Tests for Horizontal Error and Look Ahead Time for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	32609	0.000470	0.45435	0.00252
600	21908	0.236306	5.03038	0.03399
1200	12921	0.562154	7.45748	0.06561
1800	6657	0.456111	9.39249	0.11512

Means Comparisons				
Dif=Mean[i]-Mean[j]	1200	1800	600	0
1200	0.000000	0.106042	0.325848	0.561684
1800	-0.10604	0.000000	0.219806	0.455641
600	-0.32585	-0.21981	0.000000	0.235835
0	-0.56168	-0.45564	-0.23584	0.000000

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
q* = 2.56909								
Abs(Dif)-LSD	1200	1800	600	0				
1200	-0.16044	-0.08851	0.182805	0.427630				
1800	-0.08851	-0.22352	0.039329	0.282203				
600	0.182805	0.039329	-0.12321	0.123183				
0	0.427630	0.282203	0.123183	-0.10099				

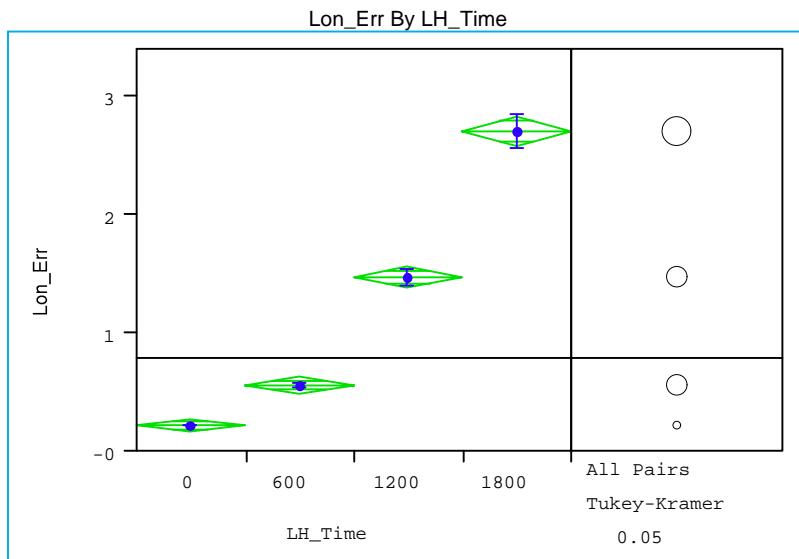
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
0	32609	0.454348	0.126259	0.126242
600	21908	5.030381	2.691498	2.655372
1200	12921	7.457478	4.036750	3.915983
1800	6657	9.392486	4.945310	4.868303

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	905.7122	3	74091	0.0000
Brown-Forsythe	4096.1593	3	74091	0.0000
Levene	4374.2475	3	74091	0.0000
Bartlett	45998.4	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	45.4172	3	18354	<.0001

Figure A.2- 4 Statistical Tests for Lateral Error and Look Ahead Time for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	32609	-0.04957	0.7666	0.00425
600	21908	0.29322	4.4286	0.02992
1200	12921	1.19392	8.3484	0.07344
1800	6657	2.42624	12.2982	0.15073

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.00000	1.23232	2.13302	2.47581
1200	-1.23232	0.00000	0.90070	1.24349
600	-2.13302	-0.90070	0.00000	0.34279
0	-2.47581	-1.24349	-0.34279	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	1800	1200	600	0
1800	-0.25111	1.01375	1.93027	2.28096
1200	1.01375	-0.18024	0.74001	1.09289
600	1.93027	0.74001	-0.13842	0.21623
0	2.28096	1.09289	0.21623	-0.11346

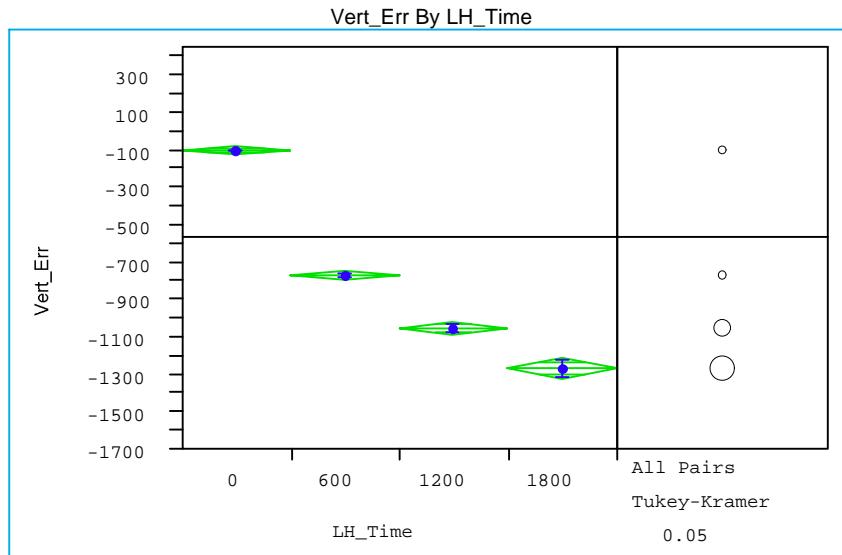
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal			MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
0	32609	0.76656	0.204627	0.204534	
600	21908	4.42865	2.824441	2.822935	
1200	12921	8.34837	5.438772	5.416451	
1800	6657	12.29819	8.178568	8.062229	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1945.4371	3	74091	0.0000
Brown-Forsythe	8726.3921	3	74091	0.0000
Levene	9121.9444	3	74091	0.0000
Bartlett	40068.356	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	226.1604	3	18464	<.0001

Figure A.2- 5 Statistical Tests for Longitudinal Error and Look Ahead Time for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
0	32609	-98.82	789.35	4.371	
600	21908	-759.82	2844.69	19.219	
1200	12921	-1053.07	3580.43	31.498	
1800	6657	-1266.59	3868.81	47.417	

Means Comparisons					
Dif=Mean[i]-Mean[j]	0	600	1200	1800	
0	0.00	661.00	954.25	1167.76	
600	-661.00	0.00	293.25	506.76	
1200	-954.25	-293.25	0.00	213.51	
1800	-1167.76	-506.76	-213.51	0.00	

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	0	600	1200	1800
0	-50.29	604.91	887.50	1081.40
600	604.91	-61.35	222.03	416.90
1200	887.50	222.03	-79.89	116.64
1800	1081.40	416.90	116.64	-111.30

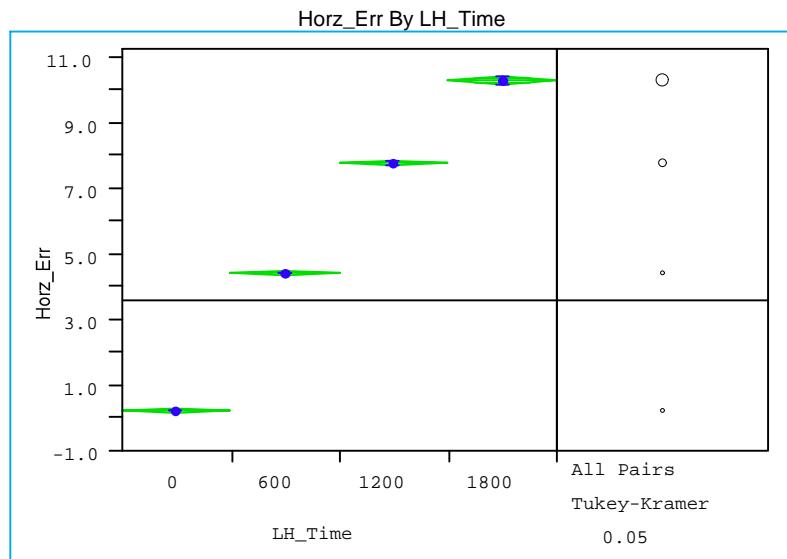
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	32609	789.350	204.724	154.004
600	21908	2844.690	1804.238	1503.764
1200	12921	3580.432	2324.048	1940.867
1800	6657	3868.811	2619.756	2163.376

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	928.7413	3	74091	0.0000
Brown-Forsythe	3277.6670	3	74091	0.0000
Levene	6270.1902	3	74091	0.0000
Bartlett	18130.9	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	839.2193	3	18933	0.0000

Figure A.2- 6 Statistical Tests for Vertical Error and Look Ahead Time for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	21209	0.2490	0.7535	0.00517
600	14807	4.4124	5.1550	0.04236
1200	8189	7.7915	8.4267	0.09312
1800	3917	10.3445	11.0827	0.17708

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.0000	2.5529	5.9321	10.0955
1200	-2.5529	0.0000	3.3792	7.5426
600	-5.9321	-3.3792	0.0000	4.1634
0	-10.0955	-7.5426	-4.1634	0.0000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q* = 2.56912	
Abs(Dif)-LSD	
1800	1800
1200	2.27728
600	5.67716
0	9.84875
1800	1200
1200	-0.22176
600	3.18375
0	7.35797
1800	600
1200	5.67716
600	-0.16492
0	4.01146
	0
	-0.13780

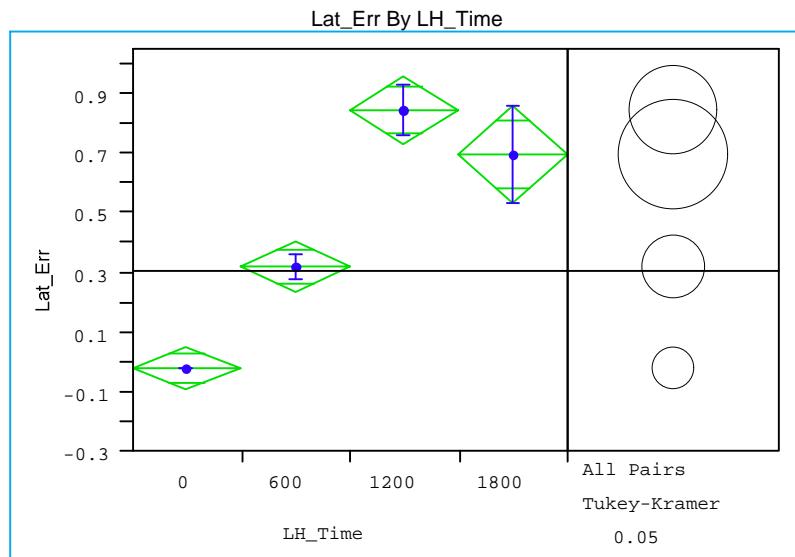
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	21209	0.75354	0.210933	0.176164
600	14807	5.15501	3.514434	3.163892
1200	8189	8.42674	5.973631	5.476191
1800	3917	11.08267	7.862517	7.195796

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	900.7762	3	48118	0.0000
Brown-Forsythe	4300.1517	3	48118	0.0000
Levene	7114.4988	3	48118	0.0000
Bartlett	24719.234	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	6381.0736	3	11314	0.0000

Figure A.2- 7 Statistical Tests for Horizontal Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	21209	-0.00108	0.4117	0.00283
600	14807	0.328630	5.3616	0.04406
1200	8189	0.863553	8.2486	0.09115
1800	3917	0.709525	10.3269	0.16500

Means Comparisons				
Dif=Mean[i]-Mean[j]	1200	1800	600	0
1200	0.000000	0.154027	0.534923	0.864633
1800	-0.15403	0.000000	0.380895	0.710606
600	-0.53492	-0.3809	0.000000	0.329711
0	-0.86463	-0.71061	-0.32971	0.000000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	1200	1800	600	0
1200	-0.21687	-0.11557	0.343812	0.684086
1800	-0.11557	-0.31358	0.131553	0.469264
600	0.343812	0.131553	-0.16128	0.181096
0	0.684086	0.469264	0.181096	-0.13476

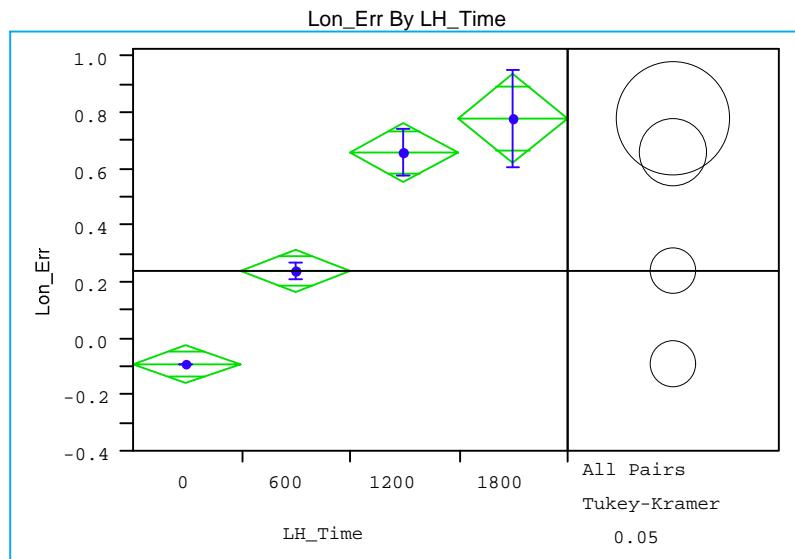
Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal		MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	
0	21209	0.41171	0.109176	0.109164
600	14807	5.36156	2.795106	2.723243
1200	8189	8.24865	4.504469	4.269265
1800	3917	10.32692	5.417549	5.240543

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	625.0230	3	48118	0.0000
Brown-Forsythe	2556.2337	3	48118	0.0000
Levene	2893.7115	3	48118	0.0000
Bartlett	32463.712	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	54.5945	3	11259	<.0001

Figure A.2- 8 Statistical Tests for Lateral Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
0	21209	-0.04456	0.6770	0.00465
600	14807	0.312483	4.1343	0.03398
1200	8189	0.702831	7.9022	0.08732
1800	3917	0.835682	11.0460	0.17649

Means Comparisons				
Dif=Mean[i]-Mean[j]	1800	1200	600	0
1800	0.000000	0.132851	0.523199	0.880243
1200	-0.13285	0.000000	0.390348	0.747392
600	-0.5232	-0.39035	0.000000	0.357044
0	-0.88024	-0.74739	-0.35704	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.56912$	
Abs(Dif)-LSD	
1800	1800
1200	-0.29611
600	-0.12173
0	0.287746
	0.652345
	1200
	-0.12173
	-0.20479
	0.209883
	0.576902
	600
	0.287746
	0.209883
	-0.1523
	0.216708
	0
	0.652345
	0.576902
	-0.12725

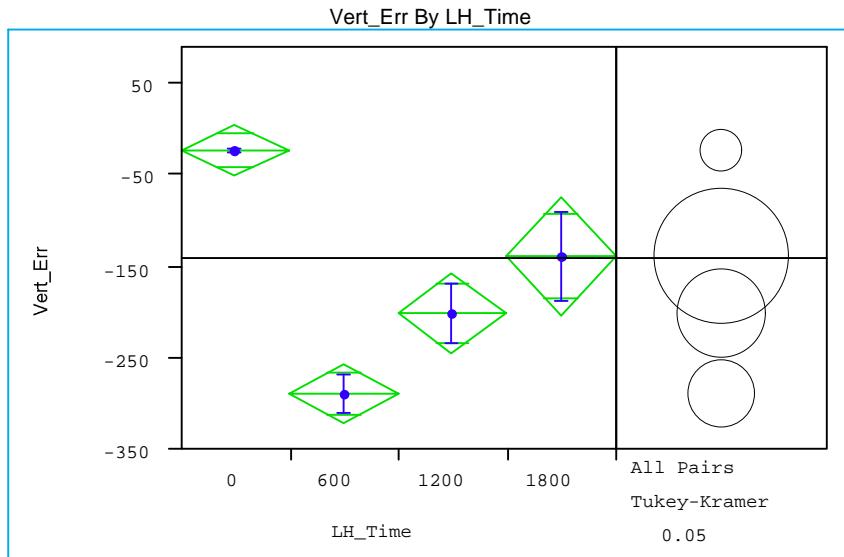
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
0	21209	0.67698	0.187322	0.187311
600	14807	4.13431	2.597534	2.592815
1200	8189	7.90224	5.063641	5.050070
1800	3917	11.04599	7.078687	7.051549

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1085.1001	3	48118	0.0000
Brown-Forsythe	5259.6511	3	48118	0.0000
Levene	5338.1311	3	48118	0.0000
Bartlett	26218.094	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	68.1760	3	11323	<.0001

Figure A.2- 9 Statistical Tests for Longitudinal Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
0	21209	-17.448	499.60	3.431
600	14807	-284.905	2594.45	21.321
1200	8189	-201.113	3061.06	33.826
1800	3917	-128.899	3058.47	48.868

Means Comparisons				
Dif=Mean[i]-Mean[j]	0	1800	1200	600
0	0.000	111.450	183.664	267.456
1800	-111.450	0.000	72.214	156.006
1200	-183.664	-72.214	0.000	83.792
600	-267.456	-156.006	-83.792	0.000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	0	1800	1200	600
0	-53.140	16.282	112.469	208.853
1800	16.282	-123.653	-34.096	57.683
1200	112.469	-34.096	-85.520	8.431
600	208.853	57.683	8.431	-63.599

Positive values show pairs of means that are significantly different.

Level	Count	Tests that the Variances are Equal			MeanAbsDif to Median
		Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
0	21209	499.596	83.588	72.401	
600	14807	2594.446	1335.927	1177.396	
1200	8189	3061.063	1461.372	1343.885	
1800	3917	3058.472	1438.069	1359.031	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	409.7103	3	48118	<.0001
Brown-Forsythe	1517.5682	3	48118	0.0000
Levene	1960.3021	3	48118	0.0000
Bartlett	15630.425	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	61.6208	3	11442	<.0001

Figure A.2- 10 Statistical Tests for Vertical Error and Look Ahead Time for Samples at Altitudes Above 18,000 Feet

A.2.1.3 Histograms

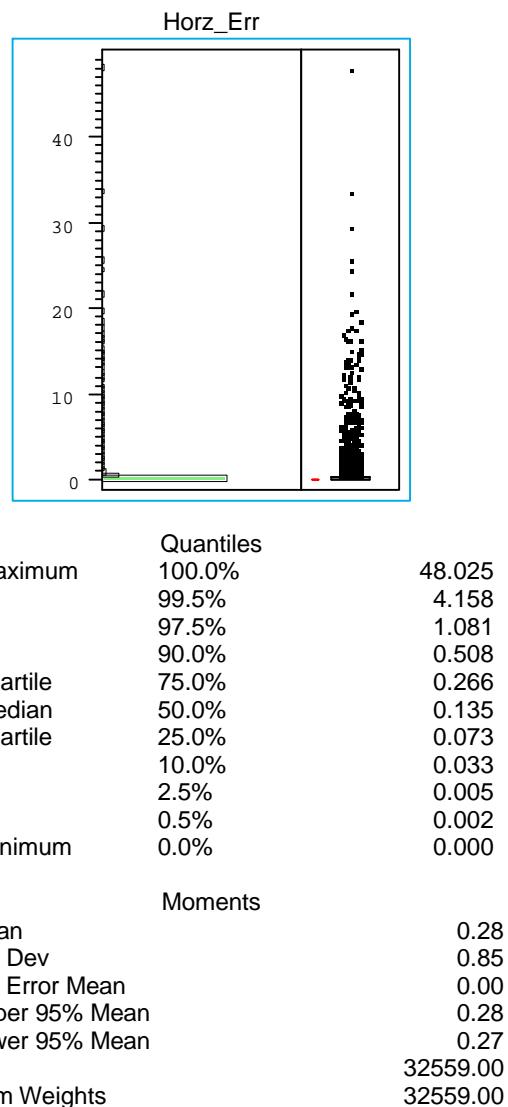
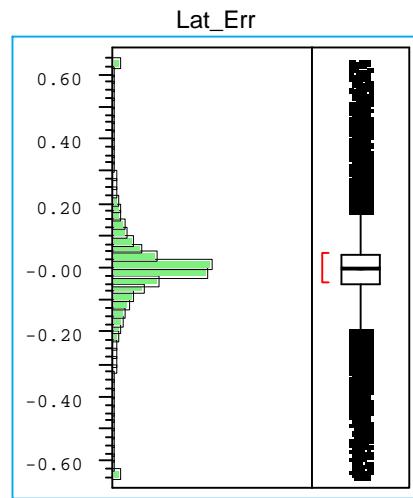
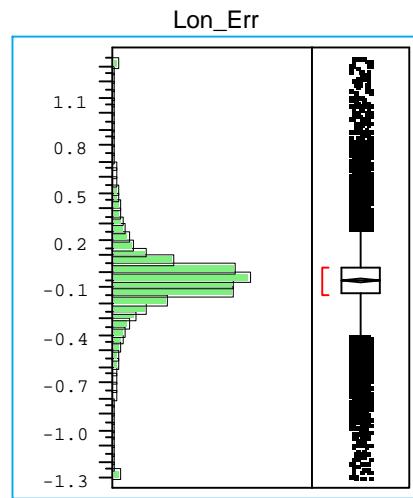


Figure A.2- 11 Histogram and Quantile for Horizontal Error and Look Ahead Time 0 for Samples at All Altitudes



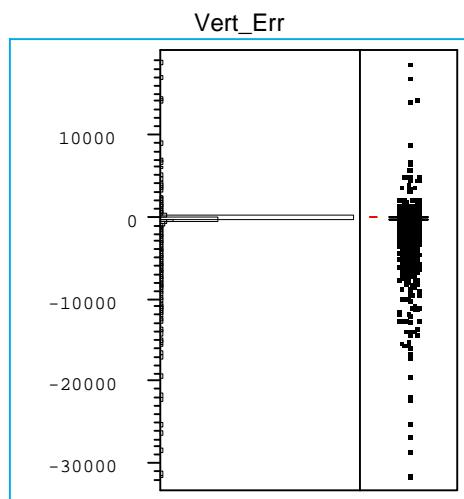
Quantiles		
maximum	100.0%	22.878
	99.5%	1.382
	97.5%	0.403
	90.0%	0.139
quartile	75.0%	0.043
median	50.0%	-0.000
quartile	25.0%	-0.048
	10.0%	-0.150
	2.5%	-0.424
	0.5%	-1.278
minimum	0.0%	-15.570
Moments		
Mean		0.00
Std Dev		0.45
Std Error Mean		0.00
Upper 95% Mean		0.01
Lower 95% Mean		-0.00
N		32559.00
Sum Weights		32559.00

Figure A.2- 12 Histogram and Quantile for Lateral Error and Look Ahead Time 0 for Samples at All Altitudes



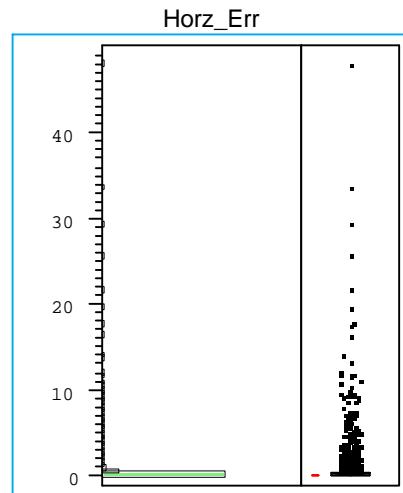
	Quantiles	
maximum	100.0%	47.539
	99.5%	1.477
	97.5%	0.567
	90.0%	0.190
quartile	75.0%	0.037
median	50.0%	-0.044
quartile	25.0%	-0.134
	10.0%	-0.279
	2.5%	-0.634
	0.5%	-1.838
minimum	0.0%	-31.165
	Moments	
Mean		-0.05
Std Dev		0.77
Std Error Mean		0.00
Upper 95% Mean		-0.04
Lower 95% Mean		-0.06
N		32559.00
Sum Weights		32559.00

Figure A.2- 13 Histogram and Quantile for Longitudinal Error and Look Ahead Time 0 for Samples at All Altitudes



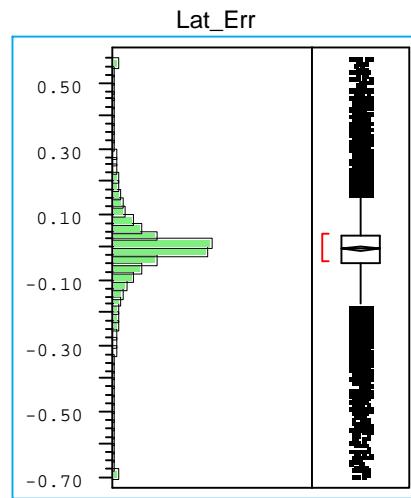
Quantiles		
maximum	100.0%	18889
	99.5%	553
	97.5%	195
	90.0%	93
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-42
	10.0%	-201
	2.5%	-866
	0.5%	-4311
minimum	0.0%	-31467
Moments		
Mean		-98.73
Std Dev		788.43
Std Error Mean		4.37
Upper 95% Mean		-90.16
Lower 95% Mean		-107.29
N		32559.00
Sum Weights		32559.00

Figure A.2- 14 Histogram and Quantile for Vertical Error and Look Ahead Time 0 for Samples at All Altitudes



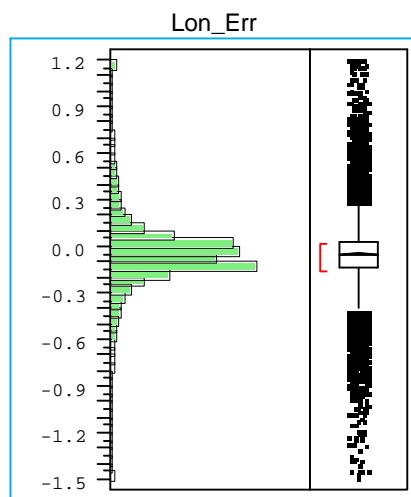
	Quantiles	
maximum	100.0%	48.025
	99.5%	2.855
	97.5%	0.919
	90.0%	0.495
quartile	75.0%	0.253
median	50.0%	0.134
quartile	25.0%	0.077
	10.0%	0.033
	2.5%	0.005
	0.5%	0.002
minimum	0.0%	0.000
 Moments		
Mean		0.25
Std Dev		0.75
Std Error Mean		0.01
Upper 95% Mean		0.26
Lower 95% Mean		0.24
N		21165.00
Sum Weights		21165.00

Figure A.2- 15 Histogram and Quantile for Horizontal Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



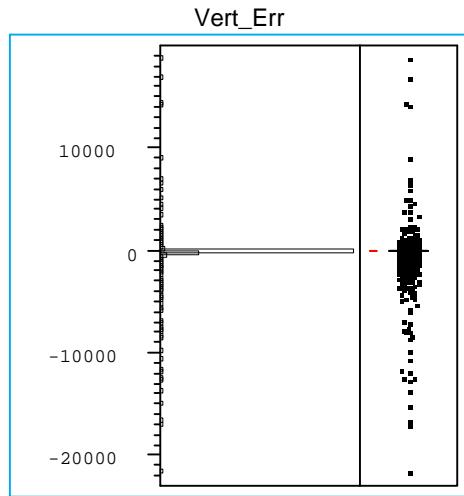
	Quantiles	
maximum	100.0%	22.878
	99.5%	0.856
	97.5%	0.354
	90.0%	0.127
quartile	75.0%	0.040
median	50.0%	-0.000
quartile	25.0%	-0.045
	10.0%	-0.136
	2.5%	-0.368
	0.5%	-0.992
minimum	0.0%	-15.570
	Moments	
Mean		-0.00
Std Dev		0.41
Std Error Mean		0.00
Upper 95% Mean		0.00
Lower 95% Mean		-0.01
N		21165.00
Sum Weights		21165.00

Figure A.2- 16 Histogram and Quantile for Lateral Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



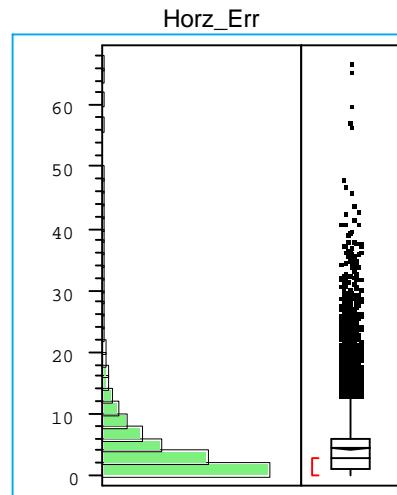
	Quantiles	
maximum	100.0%	47.539
	99.5%	1.278
	97.5%	0.575
	90.0%	0.181
quartile	75.0%	0.037
median	50.0%	-0.047
quartile	25.0%	-0.136
	10.0%	-0.263
	2.5%	-0.605
	0.5%	-1.118
minimum	0.0%	-31.165
	Moments	
Mean		-0.04
Std Dev		0.68
Std Error Mean		0.00
Upper 95% Mean		-0.04
Lower 95% Mean		-0.05
N		21165.00
Sum Weights		21165.00

Figure A.2- 17 Histogram and Quantile for Longitudinal Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



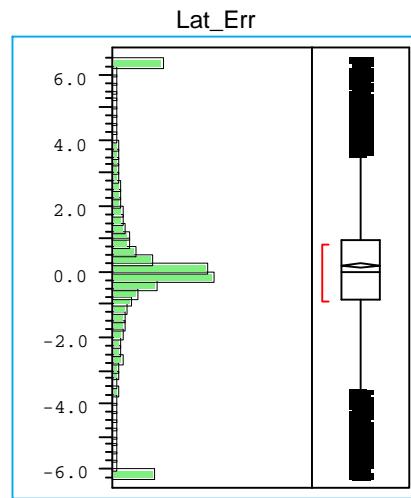
Quantiles		
maximum	100.0%	18889
	99.5%	563
	97.5%	196
	90.0%	67
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	0
	10.0%	-100
	2.5%	-292
	0.5%	-1125
minimum	0.0%	-21500
Moments		
Mean		-17.53
Std Dev		500.09
Std Error Mean		3.44
Upper 95% Mean		-10.79
Lower 95% Mean		-24.27
N		21165.00
Sum Weights		21165.00

Figure A.2- 18 Histogram and Quantile for Vertical Error and Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



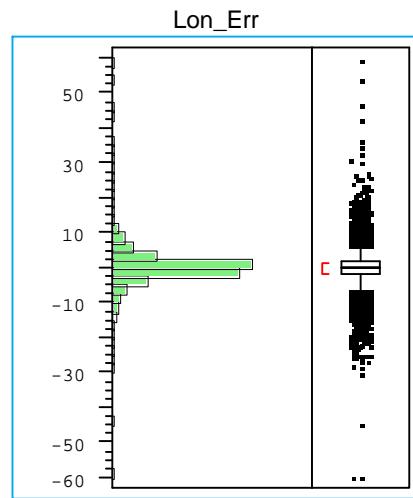
	Quantiles	
maximum	100.0%	67.078
	99.5%	28.331
	97.5%	18.050
	90.0%	10.460
quartile	75.0%	6.078
median	50.0%	2.851
quartile	25.0%	1.304
	10.0%	0.599
	2.5%	0.230
	0.5%	0.094
minimum	0.0%	0.012
	Moments	
Mean		4.53
Std Dev		4.95
Std Error Mean		0.03
Upper 95% Mean		4.59
Lower 95% Mean		4.46
N		21879.00
Sum Weights		21879.00

Figure A.2- 19 Histogram and Quantile for Horizontal Error and Look Ahead Time 600 for Samples at All Altitudes



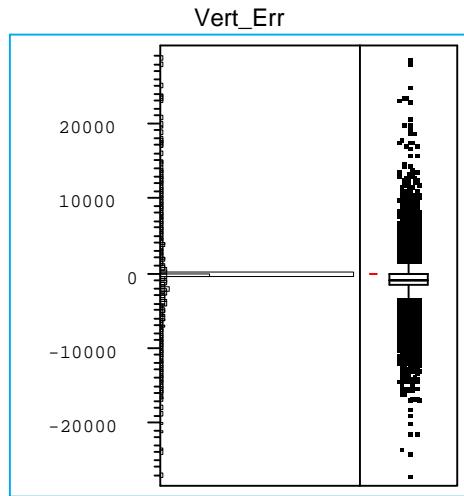
Quantiles		
maximum	100.0%	55.499
	99.5%	22.137
	97.5%	12.308
	90.0%	4.611
quartile	75.0%	0.975
median	50.0%	-0.001
quartile	25.0%	-0.820
	10.0%	-3.807
	2.5%	-9.991
	0.5%	-19.225
minimum	0.0%	-38.275
Moments		
Mean		0.24
Std Dev		5.03
Std Error Mean		0.03
Upper 95% Mean		0.30
Lower 95% Mean		0.17
N		21879.00
Sum Weights		21879.00

Figure A.2- 20 Histogram and Quantile for Lateral Error and Look Ahead Time 600 for Samples at All Altitudes



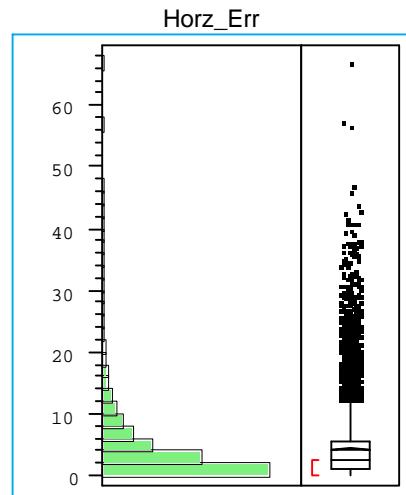
Quantiles		
maximum	100.0%	59.630
	99.5%	16.290
	97.5%	9.523
	90.0%	4.909
quartile	75.0%	1.945
median	50.0%	0.204
quartile	25.0%	-1.359
	10.0%	-3.911
	2.5%	-9.361
	0.5%	-15.604
minimum	0.0%	-59.561
Moments		
Mean		0.29
Std Dev		4.43
Std Error Mean		0.03
Upper 95% Mean		0.35
Lower 95% Mean		0.24
N		21879.00
Sum Weights		21879.00

Figure A.2- 21 Histogram and Quantile for Longitudinal Error and Look Ahead Time 600 for Samples at All Altitudes



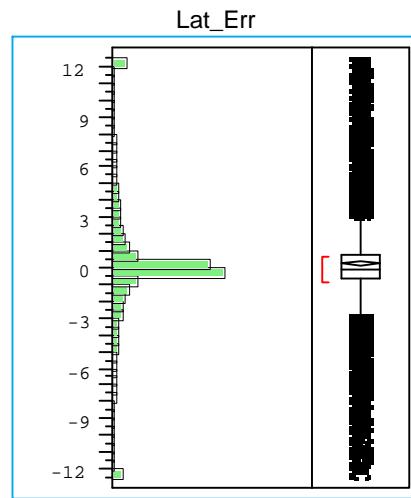
Quantiles		
maximum	100.0%	28990
	99.5%	9362
	97.5%	4200
	90.0%	680
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-1264
	10.0%	-4210
	2.5%	-7683
	0.5%	-11096
minimum	0.0%	-26868
Moments		
Mean		-759.30
Std Dev		2843.26
Std Error Mean		19.22
Upper 95% Mean		-721.62
Lower 95% Mean		-796.97
N		21879.00
Sum Weights		21879.00

Figure A.2- 22 Histogram and Quantile for Vertical Error and Look Ahead Time 600 for Samples at All Altitudes



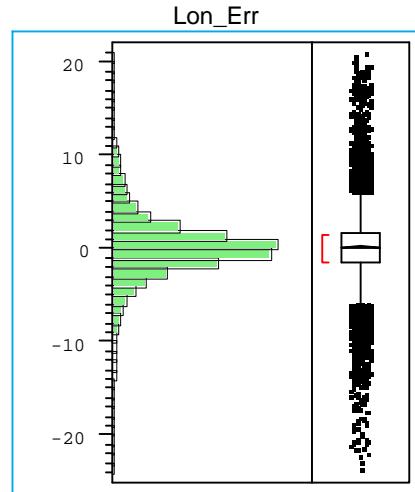
	Quantiles	
maximum	100.0%	67.078
	99.5%	30.332
	97.5%	18.932
	90.0%	10.476
quartile	75.0%	5.697
median	50.0%	2.618
quartile	25.0%	1.191
	10.0%	0.542
	2.5%	0.209
	0.5%	0.078
minimum	0.0%	0.012
 Moments		
Mean		4.41
Std Dev		5.16
Std Error Mean		0.04
Upper 95% Mean		4.50
Lower 95% Mean		4.33
N		14781.00
Sum Weights		14781.00

Figure A.2- 23 Histogram and Quantile for Horizontal Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



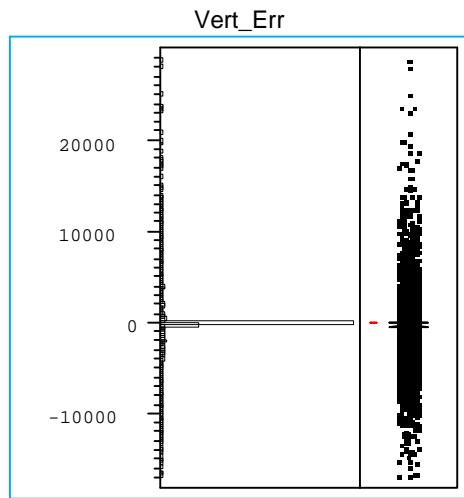
Quantiles		
maximum	100.0%	55.499
	99.5%	25.207
	97.5%	13.303
	90.0%	4.808
quartile	75.0%	0.875
median	50.0%	-0.001
quartile	25.0%	-0.589
	10.0%	-3.741
	2.5%	-10.708
	0.5%	-20.190
minimum	0.0%	-38.275
Moments		
Mean		0.33
Std Dev		5.36
Std Error Mean		0.04
Upper 95% Mean		0.41
Lower 95% Mean		0.24
N		14781.00
Sum Weights		14781.00

Figure A.2- 24 Histogram and Quantile for Lateral Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



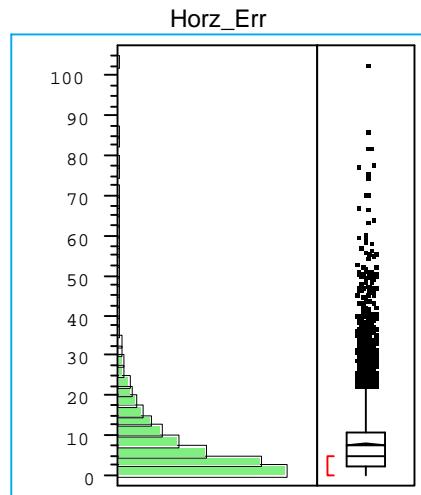
	Quantiles	
maximum	100.0%	59.630
	99.5%	17.181
	97.5%	9.452
	90.0%	4.290
quartile	75.0%	1.737
median	50.0%	0.164
quartile	25.0%	-1.309
	10.0%	-3.449
	2.5%	-8.064
	0.5%	-13.862
minimum	0.0%	-29.720
 Moments		
Mean		0.32
Std Dev		4.13
Std Error Mean		0.03
Upper 95% Mean		0.38
Lower 95% Mean		0.25
N		14781.00
Sum Weights		14781.00

Figure A.2- 25 Histogram and Quantile for Longitudinal Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



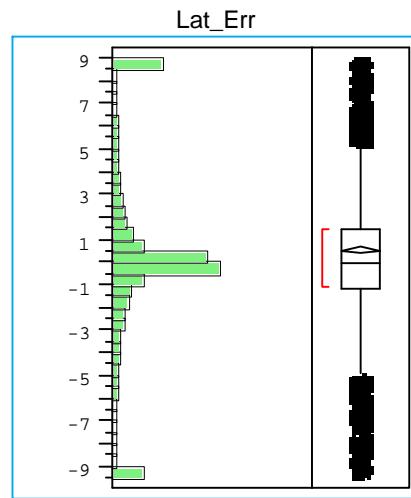
Quantiles		
maximum	100.0%	28990
	99.5%	10602
	97.5%	4810
	90.0%	1000
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-19
	10.0%	-3083
	2.5%	-6588
	0.5%	-10171
minimum	0.0%	-16708
Moments		
Mean		-285.52
Std Dev		2596.63
Std Error Mean		21.36
Upper 95% Mean		-243.66
Lower 95% Mean		-327.39
N		14781.00
Sum Weights		14781.00

Figure A.2- 26 Histogram and Quantile for Vertical Error and Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



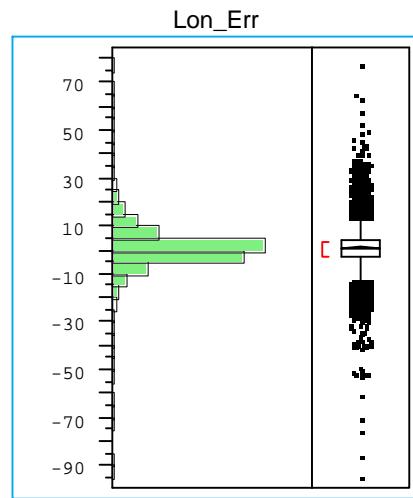
	Quantiles	
maximum	100.0%	103.04
	99.5%	45.67
	97.5%	28.82
	90.0%	18.21
quartile	75.0%	10.68
median	50.0%	5.08
quartile	25.0%	2.36
	10.0%	1.11
	2.5%	0.40
	0.5%	0.15
minimum	0.0%	0.01
 Moments		
Mean		7.82
Std Dev		8.12
Std Error Mean		0.07
Upper 95% Mean		7.96
Lower 95% Mean		7.68
N		12906.00
Sum Weights		12906.00

Figure A.2- 27 Histogram and Quantile for Horizontal Error and Look Ahead Time 1200 for Samples at All Altitudes



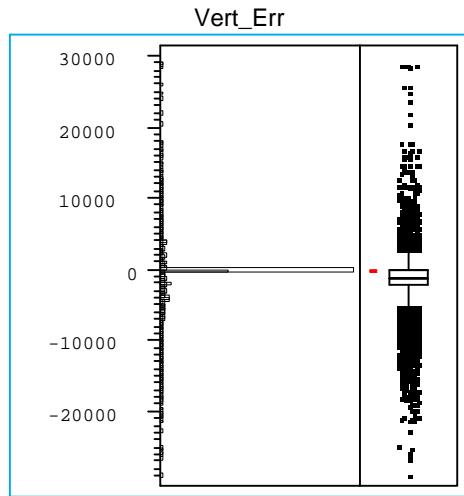
	Quantiles	
maximum	100.0%	76.097
	99.5%	31.484
	97.5%	19.275
	90.0%	7.327
quartile	75.0%	1.434
median	50.0%	0.003
quartile	25.0%	-1.103
	10.0%	-5.291
	2.5%	-13.911
	0.5%	-27.595
minimum	0.0%	-55.557
	Moments	
Mean		0.56
Std Dev		7.46
Std Error Mean		0.07
Upper 95% Mean		0.69
Lower 95% Mean		0.43
N		12906.00
Sum Weights		12906.00

Figure A.2- 28 Histogram and Quantile for Lateral Error and Look Ahead Time 1200 for Samples at All Altitudes



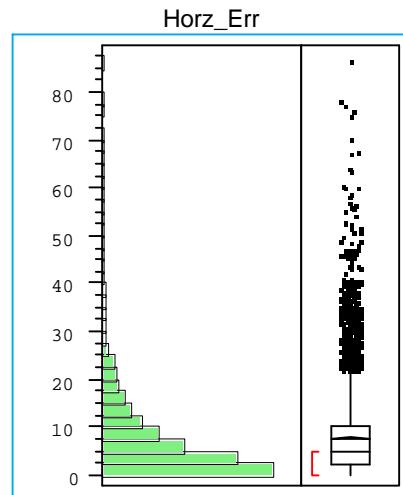
Quantiles		
maximum	100.0%	77.593
	99.5%	33.079
	97.5%	20.209
	90.0%	10.599
quartile	75.0%	4.145
median	50.0%	0.678
quartile	25.0%	-2.332
	10.0%	-6.634
	2.5%	-14.954
	0.5%	-25.366
minimum	0.0%	-94.354
Moments		
Mean		1.20
Std Dev		8.35
Std Error Mean		0.07
Upper 95% Mean		1.34
Lower 95% Mean		1.05
N		12906.00
Sum Weights		12906.00

Figure A.2- 29 Histogram and Quantile for Longitudinal Error and Look Ahead Time 1200 for Samples at All Altitudes



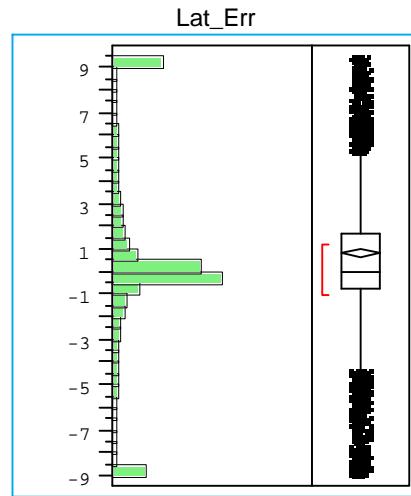
Quantiles		
maximum	100.0%	29003
	99.5%	11400
	97.5%	4996
	90.0%	894
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-2000
	10.0%	-5533
	2.5%	-9956
	0.5%	-15000
minimum	0.0%	-28868
Moments		
Mean		-1054.38
Std Dev		3582.30
Std Error Mean		31.53
Upper 95% Mean		-992.57
Lower 95% Mean		-1116.19
N		12906.00
Sum Weights		12906.00

Figure A.2- 30 Histogram and Quantile for Vertical Error and Look Ahead Time 1200 for Samples at All Altitudes



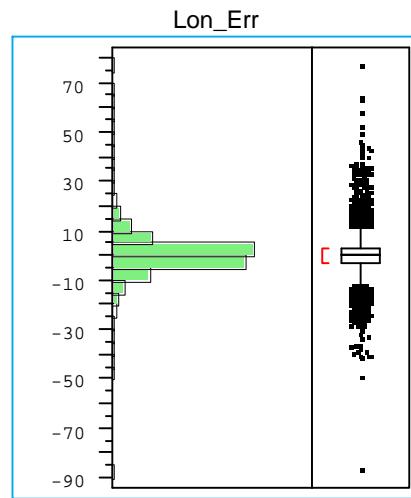
	Quantiles	
maximum	100.0%	86.730
	99.5%	46.966
	97.5%	31.471
	90.0%	18.739
quartile	75.0%	10.329
median	50.0%	4.878
quartile	25.0%	2.239
	10.0%	1.022
	2.5%	0.356
	0.5%	0.152
minimum	0.0%	0.010
	Moments	
Mean		7.793
Std Dev		8.433
Std Error Mean		0.093
Upper 95% Mean		7.976
Lower 95% Mean		7.610
N		8174.000
Sum Weights		8174.000

Figure A.2- 31 Histogram and Quantile for Horizontal Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



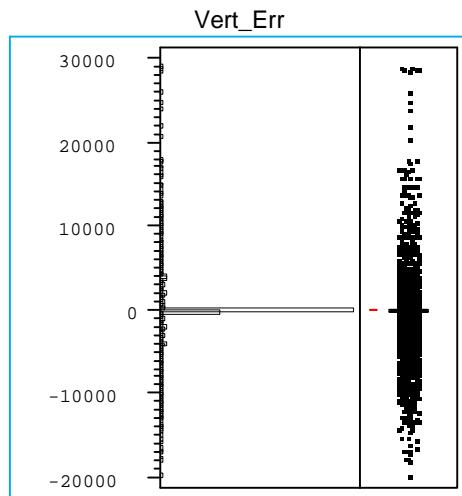
Quantiles		
maximum	100.0%	76.097
	99.5%	38.178
	97.5%	20.816
	90.0%	8.617
quartile	75.0%	1.685
median	50.0%	0.012
quartile	25.0%	-0.725
	10.0%	-5.491
	2.5%	-15.418
	0.5%	-29.866
minimum	0.0%	-55.557
Moments		
Mean		0.864
Std Dev		8.254
Std Error Mean		0.091
Upper 95% Mean		1.043
Lower 95% Mean		0.685
N		8174.000
Sum Weights		8174.000

Figure A.2- 32 Histogram and Quantile for Lateral Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



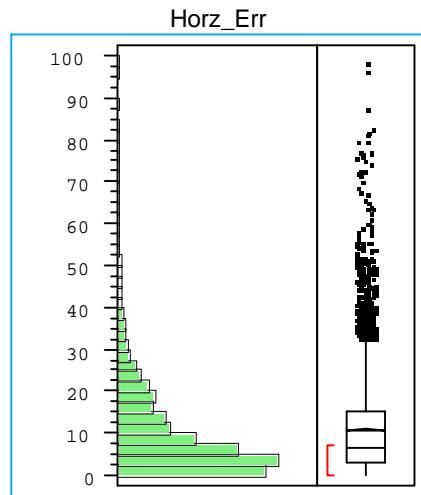
Quantiles		
maximum	100.0%	77.593
	99.5%	34.644
	97.5%	18.449
	90.0%	8.733
quartile	75.0%	3.429
median	50.0%	0.314
quartile	25.0%	-2.606
	10.0%	-6.633
	2.5%	-14.938
	0.5%	-25.017
minimum	0.0%	-85.873
Moments		
Mean		0.710
Std Dev		7.904
Std Error Mean		0.087
Upper 95% Mean		0.881
Lower 95% Mean		0.538
N		8174.000
Sum Weights		8174.000

Figure A.2- 33 Histogram and Quantile for Longitudinal Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



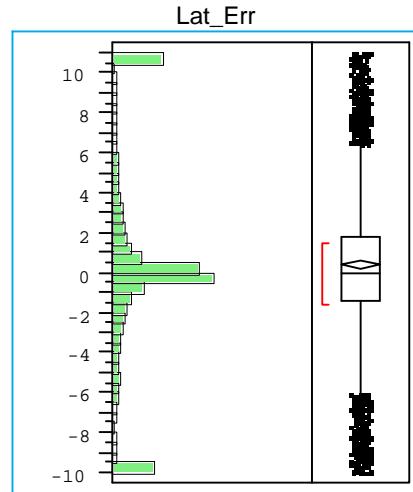
Quantiles		
maximum	100.0%	29003
	99.5%	13987
	97.5%	5998
	90.0%	1990
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-12
	10.0%	-3328
	2.5%	-7014
	0.5%	-11663
minimum	0.0%	-19633
Moments		
Mean		-201.604
Std Dev		3063.830
Std Error Mean		33.888
Upper 95% Mean		-135.174
Lower 95% Mean		-268.035
N		8174.000
Sum Weights		8174.000

Figure A.2- 34 Histogram and Quantile for Vertical Error and Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



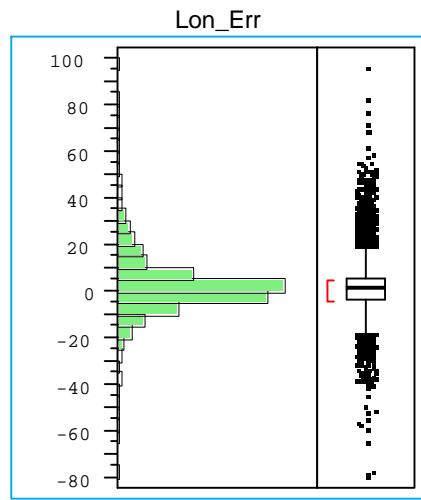
	Quantiles	
maximum	100.0%	98.819
	99.5%	60.160
	97.5%	41.289
	90.0%	25.177
quartile	75.0%	15.152
median	50.0%	6.972
quartile	25.0%	3.265
	10.0%	1.511
	2.5%	0.539
	0.5%	0.202
minimum	0.0%	0.033
Moments		
Mean		10.944
Std Dev		11.221
Std Error Mean		0.138
Upper 95% Mean		11.214
Lower 95% Mean		10.674
N		6652.000
Sum Weights		6652.000

Figure A.2- 35 Histogram and Quantile for Horizontal Error and Look Ahead Time 1800 for Samples at All Altitudes



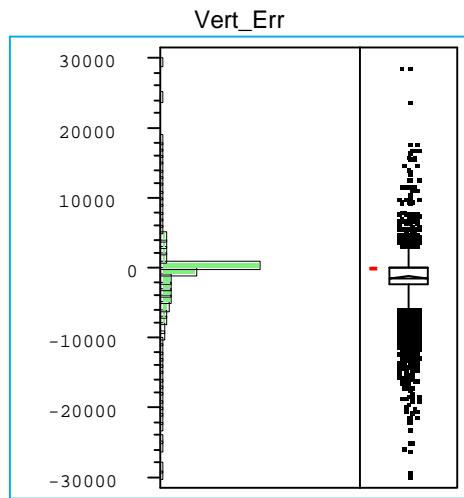
Quantiles		
maximum	100.0%	86.540
	99.5%	38.179
	97.5%	20.862
	90.0%	8.903
quartile	75.0%	1.800
median	50.0%	0.001
quartile	25.0%	-1.327
	10.0%	-6.680
	2.5%	-19.617
	0.5%	-36.906
minimum	0.0%	-62.208
Moments		
Mean		0.455
Std Dev		9.395
Std Error Mean		0.115
Upper 95% Mean		0.681
Lower 95% Mean		0.229
N		6652.000
Sum Weights		6652.000

Figure A.2- 36 Histogram and Quantile for Lateral Error and Look Ahead Time 1800 for Samples at All Altitudes



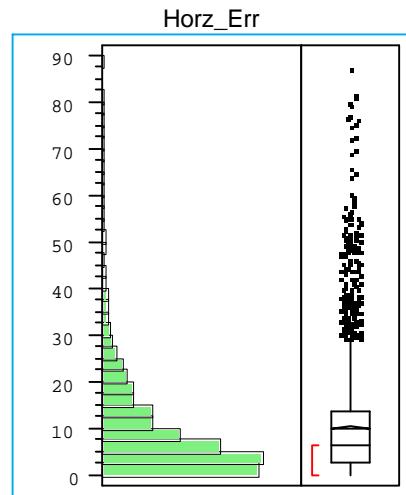
	Quantiles	
maximum	100.0%	96.864
	99.5%	50.147
	97.5%	32.840
	90.0%	17.798
quartile	75.0%	6.068
median	50.0%	1.039
quartile	25.0%	-3.394
	10.0%	-9.044
	2.5%	-19.133
	0.5%	-36.379
minimum	0.0%	-78.603
	Moments	
Mean		2.433
Std Dev		12.300
Std Error Mean		0.151
Upper 95% Mean		2.728
Lower 95% Mean		2.137
N		6652.000
Sum Weights		6652.000

Figure A.2- 37 Histogram and Quantile for Longitudinal Error and Look Ahead Time 1800 for Samples at All Altitudes



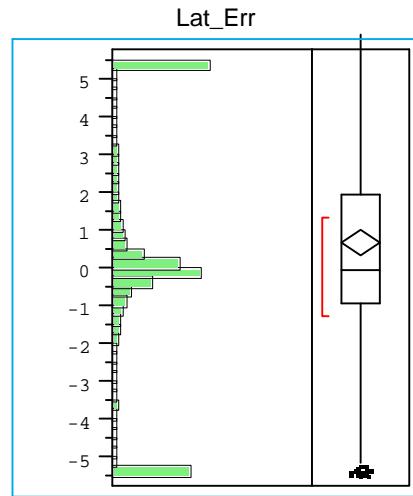
Quantiles		
maximum	100.0%	29003
	99.5%	10171
	97.5%	4183
	90.0%	1000
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-2217
	10.0%	-6283
	2.5%	-11092
	0.5%	-16573
minimum	0.0%	-29635
Moments		
Mean		-1267.540
Std Dev		3870.108
Std Error Mean		47.451
Upper 95% Mean		-1174.519
Lower 95% Mean		-1360.561
N		6652.000
Sum Weights		6652.000

Figure A.2- 38 Histogram and Quantile for Vertical Error and Look Ahead Time 1800 for Samples at All Altitudes



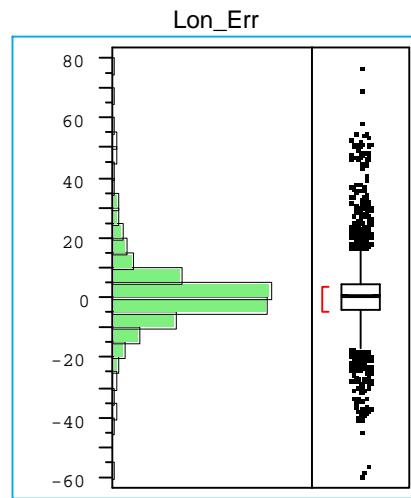
	Quantiles	
maximum	100.0%	87.650
	99.5%	59.734
	97.5%	43.374
	90.0%	23.817
quartile	75.0%	13.729
median	50.0%	6.567
quartile	25.0%	3.048
	10.0%	1.401
	2.5%	0.476
	0.5%	0.167
minimum	0.0%	0.033
 Moments		
Mean		10.348
Std Dev		11.088
Std Error Mean		0.177
Upper 95% Mean		10.696
Lower 95% Mean		10.001
N		3912.000
Sum Weights		3912.000

Figure A.2- 39 Histogram and Quantile for Horizontal Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



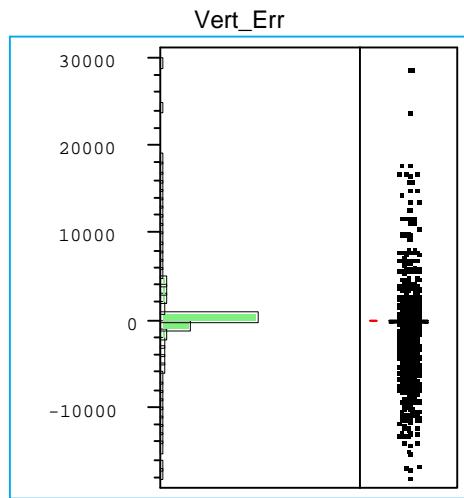
	Quantiles	
maximum	100.0%	86.540
	99.5%	49.046
	97.5%	21.972
	90.0%	10.498
quartile	75.0%	1.948
median	50.0%	-0.004
quartile	25.0%	-0.898
	10.0%	-7.210
	2.5%	-21.145
	0.5%	-42.319
minimum	0.0%	-62.208
 Moments		
Mean		0.708
Std Dev		10.332
Std Error Mean		0.165
Upper 95% Mean		1.032
Lower 95% Mean		0.384
N		3912.000
Sum Weights		3912.000

Figure A.2- 40 Histogram and Quantile for Lateral Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



	Quantiles	
maximum	100.0%	77.472
	99.5%	51.686
	97.5%	28.083
	90.0%	10.933
quartile	75.0%	4.550
median	50.0%	0.232
quartile	25.0%	-3.971
	10.0%	-9.537
	2.5%	-19.839
	0.5%	-36.939
minimum	0.0%	-58.652
	Moments	
Mean		0.844
Std Dev		11.049
Std Error Mean		0.177
Upper 95% Mean		1.191
Lower 95% Mean		0.498
N		3912.000
Sum Weights		3912.000

Figure A.2- 41 Histogram and Quantile for Longitudinal Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Quantiles		
maximum	100.0%	29003
	99.5%	12994
	97.5%	5983
	90.0%	2638
quartile	75.0%	0
median	50.0%	0
quartile	25.0%	-6
	10.0%	-3000
	2.5%	-8085
	0.5%	-12354
minimum	0.0%	-17851
Moments		
Mean		-129.068
Std Dev		3060.423
Std Error Mean		48.931
Upper 95% Mean		-33.134
Lower 95% Mean		-225.001
N		3912.000
Sum Weights		3912.000

Figure A.2- 42 Histogram and Quantile for Vertical Error and Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.2.2 Flight Type Per Look Ahead Time

A.2.2.1 Summary Tables

Flight type	LOOKAHEAD TIME			0 Seconds
	OVR	ARR	DEP	INR
Sample Quantity	9811	9698	9424	3626
Avg. Horz. Error	0.24	0.31	0.25	0.33
Stddev. Horz. Error	0.91	0.81	0.61	1.23
Max. Horz. Error	48.02	19.85	21.86	33.7
Min. Horz. Error	0	0	0	0
Avg. Lat. Error	0	0	-0.01	0.02
Stddev. Lat. Error	0.34	0.52	0.39	0.65
Max. Lat. Error	22.88	18.66	10.75	13.61
Min. Lat. Error	-3.72	-15.57	-11.26	-5.34
Avg. Abs. Lat. Error	0.09	0.16	0.11	0.17
Stddev. Abs. Lat. Error	0.33	0.49	0.37	0.63
Max. Abs. Lat. Error	22.88	18.66	11.26	13.61
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.06	-0.05	-0.03	-0.08
Stddev. Long. Error	0.87	0.69	0.53	1.1
Max. Long. Error	47.54	14.47	11.54	16.44
Min. Long. Error	-23.09	-13.58	-21.17	-31.16
Avg. Abs. Long. Error	0.2	0.22	0.19	0.25
Stddev. Abs. Long. Error	0.85	0.66	0.49	1.07
Max. Abs. Long. Error	47.54	14.47	21.17	31.16
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-26.65	-136.85	-86.47	-223.64
Stddev. Vert. Error	628.2	767.97	839.17	1035.82
Max. Vert. Error	17000	5200	7125	18889
Min. Vert. Error	-26348	-15565.9	-31466.5	-13425
Avg. Abs. Vert. Error	64.75	187.89	147.88	319.91
Stddev. Abs. Vert. Error	625.42	757.1	830.55	1010.24
Max. Abs. Vert. Error	26348	15565.91	31466.46	18889
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	0.24	0.32	0.26	0.35
Stddev. Slant Range Error	0.91	0.82	0.62	1.24
Max. Slant Range Error	48.03	19.91	21.87	33.78
Min. Slant Range Error	0	0	0	0

Figure A.2- 43 Descriptive Statistics for Flight Types at Look Ahead Time of 0 and Samples at All Altitudes

LOOKAHEAD TIME 300 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	8358	8055	7739	2971
Avg. Horz. Error	1.85	3.03	2.89	3.14
Stddev. Horz. Error	2.61	3.34	3.19	3.82
Max. Horz. Error	46.09	55.05	33.37	88.45
Min. Horz. Error	0	0.01	0.01	0.03
Avg. Lat. Error	-0.06	-0.06	0.19	0.08
Stddev. Lat. Error	2.49	3.72	3.58	3.32
Max. Lat. Error	27.04	46.61	32.28	29.48
Min. Lat. Error	-22.88	-46.12	-25.39	-36.48
Avg. Abs. Lat. Error	1.1	2.14	1.94	1.88
Stddev. Abs. Lat. Error	2.24	3.05	3.02	2.73
Max. Abs. Lat. Error	27.04	46.61	32.28	36.48
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.06	-0.1	0.02	-0.17
Stddev. Long. Error	2	2.55	2.38	3.66
Max. Long. Error	46.01	22.74	15.07	17.54
Min. Long. Error	-27.41	-29.29	-22.36	-87.99
Avg. Abs. Long. Error	1.11	1.6	1.59	1.94
Stddev. Abs. Long. Error	1.67	1.99	1.77	3.1
Max. Abs. Long. Error	46.01	29.29	22.36	87.99
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-56.9	-1018.42	-362.16	-955.35
Stddev. Vert. Error	1148.48	2461.8	2084.76	3104.14
Max. Vert. Error	17000	13350	13961	27290
Min. Vert. Error	-17800	-17950	-24677	-14639
Avg. Abs. Vert. Error	309.08	1532.73	1065.32	1896.9
Stddev. Abs. Vert. Error	1107.57	2179.04	1828.21	2636.14
Max. Abs. Vert. Error	17800	17950	24677	27290
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	1.86	3.07	2.91	3.19
Stddev. Slant Range Error	2.61	3.33	3.19	3.81
Max. Slant Range Error	46.09	55.05	33.37	88.56
Min. Slant Range Error	0.01	0.01	0.01	0.03

Figure A.2- 44 Descriptive Statistics for Flight Types at Look Ahead Time of 300 and Samples at All Altitudes

LOOKAHEAD TIME 600 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	6964	6410	6127	2378
Avg. Horz. Error	3.26	4.81	5.35	5.33
Stddev. Horz. Error	4.41	4.73	5.48	4.89
Max. Horz. Error	56.87	67.08	65.69	36.75
Min. Horz. Error	0.01	0.02	0.01	0.04
Avg. Lat. Error	-0.06	-0.07	0.86	0.33
Stddev. Lat. Error	4.23	4.89	5.96	4.82
Max. Lat. Error	55.5	33.84	38.94	33.12
Min. Lat. Error	-34.77	-38.27	-32.29	-33.24
Avg. Abs. Lat. Error	1.81	2.93	3.28	2.78
Stddev. Abs. Lat. Error	3.82	3.92	5.04	3.95
Max. Abs. Lat. Error	55.5	38.27	38.94	33.24
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.02	0.23	0.46	0.82
Stddev. Long. Error	3.49	4.64	4.72	5.32
Max. Long. Error	46.83	59.63	30.58	34.91
Min. Long. Error	-28	-59.4	-59.56	-26.29
Avg. Abs. Long. Error	2.04	3.02	3.19	3.66
Stddev. Abs. Long. Error	2.83	3.53	3.51	3.95
Max. Abs. Long. Error	46.83	59.63	59.56	34.91
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-106.29	-1923.41	-140.57	-1127.88
Stddev. Vert. Error	1577.38	3217.9	2691.21	3808.73
Max. Vert. Error	17000	17800	23878	28990
Min. Vert. Error	-16406.8	-26868	-14510	-14944.7
Avg. Abs. Vert. Error	476.56	2388.78	1395.55	2406.97
Stddev. Abs. Vert. Error	1507.41	2889.25	2305.32	3159.6
Max. Abs. Vert. Error	17000	26868	23878	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	3.28	4.87	5.38	5.38
Stddev. Slant Range Error	4.41	4.71	5.48	4.88
Max. Slant Range Error	56.87	67.09	65.69	36.75
Min. Slant Range Error	0.01	0.03	0.01	0.04

Figure A.2- 45 Descriptive Statistics for Flight Types at Look Ahead Time of 600 and Samples at All Altitudes

LOOKAHEAD TIME 900 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	5655	4791	4629	1846
Avg. Horz. Error	4.66	6.22	7.54	7.58
Stddev. Horz. Error	6.17	5.88	7.06	7.04
Max. Horz. Error	62.17	86.49	101.09	75.25
Min. Horz. Error	0.01	0.02	0.03	0.05
Avg. Lat. Error	-0.01	-0.06	1.63	0.34
Stddev. Lat. Error	5.9	5.33	7.65	5.97
Max. Lat. Error	60.84	32.02	54.78	42.67
Min. Lat. Error	-39.76	-38.45	-64.27	-43.96
Avg. Abs. Lat. Error	2.49	3.23	4.45	3.4
Stddev. Abs. Lat. Error	5.35	4.25	6.44	4.92
Max. Abs. Lat. Error	60.84	38.45	64.27	43.96
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.15	0.69	0.65	2.01
Stddev. Long. Error	5	6.67	6.72	8.2
Max. Long. Error	37.39	58.31	30.21	49.55
Min. Long. Error	-31.86	-83.04	-78.02	-61.99
Avg. Abs. Long. Error	3	4.39	4.65	5.69
Stddev. Abs. Long. Error	4	5.07	4.88	6.24
Max. Abs. Long. Error	37.39	83.04	78.02	61.99
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-154.69	-2586.96	56.28	-1322.46
Stddev. Vert. Error	1947.04	3795.44	3083.09	4361.4
Max. Vert. Error	17000	17747	29003	28990
Min. Vert. Error	-20550	-32426	-17600	-14560.4
Avg. Abs. Vert. Error	613.01	3059.18	1499.78	2796.43
Stddev. Abs. Vert. Error	1854.47	3426.17	2694.21	3598.25
Max. Abs. Vert. Error	20550	32426	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.68	6.3	7.57	7.63
Stddev. Slant Range Error	6.17	5.85	7.05	7.03
Max. Slant Range Error	62.17	86.49	101.09	75.4
Min. Slant Range Error	0.01	0.04	0.05	0.05

Figure A.2- 46 Descriptive Statistics for Flight Types at Look Ahead Time of 900 and Samples at All Altitudes

LOOKAHEAD TIME 1200 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	4484	3585	3426	1411
Avg. Horz. Error	6.09	7.58	9.57	9.72
Stddev. Horz. Error	7.92	7.04	8.45	9.15
Max. Horz. Error	78.4	63.92	103.04	86.73
Min. Horz. Error	0.03	0.02	0.01	0.09
Avg. Lat. Error	-0.02	0.02	2.18	-0.15
Stddev. Lat. Error	7.37	5.92	8.91	6.78
Max. Lat. Error	76.1	36.69	53.39	41.78
Min. Lat. Error	-55.56	-38.88	-49.48	-50.89
Avg. Abs. Lat. Error	3.11	3.53	5.4	3.88
Stddev. Abs. Lat. Error	6.68	4.76	7.41	5.56
Max. Abs. Lat. Error	76.1	38.88	53.39	50.89
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.37	1.39	1.12	3.55
Stddev. Long. Error	6.73	8.37	8.81	10.94
Max. Long. Error	38.33	63.92	44.46	77.59
Min. Long. Error	-40.8	-38.96	-94.35	-85.87
Avg. Abs. Long. Error	4.03	5.64	6.21	7.71
Stddev. Abs. Long. Error	5.4	6.34	6.35	8.53
Max. Abs. Long. Error	40.8	63.92	94.35	85.87
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-209.47	-2970.29	68.13	-1597.06
Stddev. Vert. Error	2166.89	4031.85	3271.64	4499.37
Max. Vert. Error	17000	15000	29003	28990
Min. Vert. Error	-25050	-28868	-24801	-16582.5
Avg. Abs. Vert. Error	711.38	3444.47	1542.73	3014.31
Stddev. Abs. Vert. Error	2057.46	3635	2885.76	3701.93
Max. Abs. Vert. Error	25050	28868	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	6.1	7.66	9.6	9.77
Stddev. Slant Range Error	7.92	7.01	8.44	9.13
Max. Slant Range Error	78.4	63.95	103.05	86.86
Min. Slant Range Error	0.03	0.08	0.01	0.09

Figure A.2- 47 Descriptive Statistics for Flight Types at Look Ahead Time of 1200 and Samples at All Altitudes

LOOKAHEAD TIME 1500 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	3498	2394	2355	1005
Avg. Horz. Error	7.49	9.09	11.3	12.36
Stddev. Horz. Error	9.66	8.64	9.6	11.33
Max. Horz. Error	87.22	74.04	92.1	94.14
Min. Horz. Error	0.03	0.13	0.09	0.17
Avg. Lat. Error	-0.07	0.13	2.19	-0.91
Stddev. Lat. Error	8.84	6.64	9.87	7.62
Max. Lat. Error	85.67	30.91	67.1	42.67
Min. Lat. Error	-65.63	-44.45	-55.21	-58.18
Avg. Abs. Lat. Error	3.72	3.91	5.97	4.39
Stddev. Abs. Lat. Error	8.02	5.37	8.16	6.29
Max. Abs. Lat. Error	85.67	44.45	67.1	58.18
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.63	2.51	1.51	5.42
Stddev. Long. Error	8.43	10.34	10.74	13.9
Max. Long. Error	47.19	74.04	61.01	94.14
Min. Long. Error	-49.89	-45.02	-73.71	-64.82
Avg. Abs. Long. Error	5.05	6.99	7.75	10.15
Stddev. Abs. Long. Error	6.77	8.02	7.58	10.92
Max. Abs. Long. Error	49.89	74.04	73.71	94.14
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-298.32	-3329.51	90.46	-1849.84
Stddev. Vert. Error	2331.38	4341.96	3310.21	4306.76
Max. Vert. Error	17000	10600	29003	28990
Min. Vert. Error	-22800	-27901	-24904	-18609
Avg. Abs. Vert. Error	811.85	3809.9	1565.11	3120.37
Stddev. Abs. Vert. Error	2205.69	3927.02	2918.06	3496.73
Max. Abs. Vert. Error	22800	27901	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	7.51	9.17	11.32	12.42
Stddev. Slant Range Error	9.66	8.6	9.59	11.3
Max. Slant Range Error	87.23	74.04	92.1	94.14
Min. Slant Range Error	0.03	0.16	0.09	0.2

Figure A.2- 48 Descriptive Statistics for Flight Types at Look Ahead Time of 1500 and Samples at All Altitudes

LOOKAHEAD TIME 1800 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	2714	1634	1567	737
Avg. Horz. Error	8.85	11.02	12.6	14.96
Stddev. Horz. Error	11.12	10.48	10.48	12.91
Max. Horz. Error	87.65	73.08	98.82	96.9
Min. Horz. Error	0.06	0.03	0.03	0.19
Avg. Lat. Error	0.05	0.46	2.07	-1.51
Stddev. Lat. Error	9.85	8.02	10.09	8.38
Max. Lat. Error	86.54	37.65	64.33	54.57
Min. Lat. Error	-62.21	-45.06	-59.89	-42.31
Avg. Abs. Lat. Error	4.26	4.65	6.05	5.09
Stddev. Abs. Lat. Error	8.89	6.55	8.34	6.82
Max. Abs. Lat. Error	86.54	45.06	64.33	54.57
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.95	3.68	1.35	7.4
Stddev. Long. Error	10.2	12.37	12.68	16.23
Max. Long. Error	55.83	72.38	77.47	96.86
Min. Long. Error	-58.65	-50.4	-78.6	-77.43
Avg. Abs. Long. Error	6.08	8.56	9.16	12.53
Stddev. Abs. Long. Error	8.24	9.67	8.87	12.7
Max. Abs. Long. Error	58.65	72.38	78.6	96.86
Min. Abs. Long. Error	0	0	0	0.05
Avg. Vert. Error	-366.26	-3766.65	189.57	-2143.8
Stddev. Vert. Error	2399.37	4706.02	3381.19	4302.9
Max. Vert. Error	17000	10300	29003	24000
Min. Vert. Error	-21800	-29635	-19867	-19613
Avg. Abs. Vert. Error	888.46	4240.85	1655	3347.76
Stddev. Abs. Vert. Error	2258.65	4283.35	2954.25	3448.81
Max. Abs. Vert. Error	21800	29635	29003	24000
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	8.86	11.1	12.62	15.01
Stddev. Slant Range Error	11.12	10.44	10.48	12.88
Max. Slant Range Error	87.65	73.08	98.82	96.91
Min. Slant Range Error	0.06	0.24	0.03	0.19

Figure A.2- 49 Descriptive Statistics for Flight Types at Look Ahead Time of 1800 and Samples at All Altitudes

Flight type	LOOKAHEAD TIME			
	OVR	ARR	DEP	INR
Sample Quantity	8622	5944	5764	835
Avg. Horz. Error	0.23	0.25	0.26	0.36
Stddev. Horz. Error	0.82	0.44	0.69	1.68
Max. Horz. Error	48.02	17.72	21.86	33.7
Min. Horz. Error	0	0	0	0
Avg. Lat. Error	0	-0.02	-0.01	0.07
Stddev. Lat. Error	0.35	0.38	0.4	0.94
Max. Lat. Error	22.88	8.7	10.75	13.61
Min. Lat. Error	-3.72	-15.57	-10.95	-3.27
Avg. Abs. Lat. Error	0.09	0.13	0.11	0.19
Stddev. Abs. Lat. Error	0.34	0.36	0.38	0.93
Max. Abs. Lat. Error	22.88	15.57	10.95	13.61
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.04	-0.06	-0.02	-0.17
Stddev. Long. Error	0.77	0.32	0.62	1.43
Max. Long. Error	47.54	3.56	11.54	1.81
Min. Long. Error	-23.09	-8.47	-21.17	-31.16
Avg. Abs. Long. Error	0.19	0.17	0.2	0.27
Stddev. Abs. Long. Error	0.75	0.28	0.58	1.41
Max. Abs. Long. Error	47.54	8.47	21.17	31.16
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-9.52	-28.34	-27.11	42.84
Stddev. Vert. Error	478.37	251.04	560.78	1163.2
Max. Vert. Error	17000	5200	7125	18889
Min. Vert. Error	-16406.8	-5451	-21500	-11438
Avg. Abs. Vert. Error	44.64	76.9	94.69	174.86
Stddev. Abs. Vert. Error	476.38	240.64	553.39	1150.77
Max. Abs. Vert. Error	17000	5451	21500	18889
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	0.23	0.25	0.26	0.37
Stddev. Slant Range Error	0.82	0.44	0.69	1.69
Max. Slant Range Error	48.03	17.73	21.87	33.78
Min. Slant Range Error	0	0	0	0

Figure A.2- 50 Descriptive Statistics for Flight Types at Look Ahead Time of 0 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 300 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	7337	4728	5599	751
Avg. Horz. Error	1.84	2.89	2.89	3.68
Stddev. Horz. Error	2.62	3.56	3.25	5.97
Max. Horz. Error	46.09	55.05	33.37	88.45
Min. Horz. Error	0	0.01	0.01	0.03
Avg. Lat. Error	-0.07	-0.19	0.44	0.05
Stddev. Lat. Error	2.56	4.05	3.68	4.79
Max. Lat. Error	27.04	46.61	32.28	29.48
Min. Lat. Error	-22.88	-46.12	-22.33	-36.48
Avg. Abs. Lat. Error	1.1	2.24	1.96	2.49
Stddev. Abs. Lat. Error	2.32	3.37	3.15	4.09
Max. Abs. Lat. Error	27.04	46.61	32.28	36.48
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.04	-0.03	0.23	-0.07
Stddev. Long. Error	1.91	2.13	2.27	5.13
Max. Long. Error	46.01	17.18	15.07	16.44
Min. Long. Error	-27.41	-29.29	-16.41	-87.99
Avg. Abs. Long. Error	1.08	1.3	1.54	1.96
Stddev. Abs. Long. Error	1.57	1.69	1.68	4.73
Max. Abs. Long. Error	46.01	29.29	16.41	87.99
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	4.41	-556.71	-52.77	337.43
Stddev. Vert. Error	982.18	2195.66	1714.12	3794.84
Max. Vert. Error	17000	13350	13961	27290
Min. Vert. Error	-16146	-17950	-18228	-14133
Avg. Abs. Vert. Error	241.3	1147.69	891.7	1806.59
Stddev. Abs. Vert. Error	952.09	1952.8	1464.83	3353.6
Max. Abs. Vert. Error	17000	17950	18228	27290
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	1.84	2.92	2.91	3.73
Stddev. Slant Range Error	2.62	3.55	3.25	5.98
Max. Slant Range Error	46.09	55.05	33.37	88.56
Min. Slant Range Error	0.01	0.01	0.01	0.03

Figure A.2- 51 Descriptive Statistics for Flight Types at Look Ahead Time of 300 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 600 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	6069	3524	4601	587
Avg. Horz. Error	3.28	4.45	5.63	6.36
Stddev. Horz. Error	4.53	4.83	5.62	6.42
Max. Horz. Error	56.87	67.08	44.23	36.75
Min. Horz. Error	0.01	0.02	0.01	0.1
Avg. Lat. Error	-0.09	-0.23	1.31	0.36
Stddev. Lat. Error	4.39	5.16	6.28	6.73
Max. Lat. Error	55.5	33.84	38.94	33.12
Min. Lat. Error	-34.77	-38.27	-32.29	-33.24
Avg. Abs. Lat. Error	1.84	3.05	3.5	3.8
Stddev. Abs. Lat. Error	3.99	4.16	5.37	5.57
Max. Abs. Lat. Error	55.5	38.27	38.94	33.24
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.02	0.13	0.72	1.34
Stddev. Long. Error	3.46	4.05	4.66	5.87
Max. Long. Error	46.83	59.63	30.58	34.91
Min. Long. Error	-28	-21.22	-29.72	-22.22
Avg. Abs. Long. Error	2.02	2.47	3.28	3.99
Stddev. Abs. Long. Error	2.82	3.21	3.39	4.5
Max. Abs. Long. Error	46.83	59.63	30.58	34.91
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-1.04	-1413.52	125.61	322.53
Stddev. Vert. Error	1404.76	3060.83	2690.82	5126.08
Max. Vert. Error	17000	17800	23878	28990
Min. Vert. Error	-16406.8	-16708	-14510	-11000
Avg. Abs. Vert. Error	391.85	1981.42	1409.53	2698.07
Stddev. Abs. Vert. Error	1348.99	2727.66	2295.45	4369.08
Max. Abs. Vert. Error	17000	17800	23878	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	3.29	4.51	5.66	6.41
Stddev. Slant Range Error	4.53	4.81	5.61	6.42
Max. Slant Range Error	56.87	67.09	44.23	36.75
Min. Slant Range Error	0.01	0.03	0.01	0.13

Figure A.2- 52 Descriptive Statistics for Flight Types at Look Ahead Time of 600 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 900 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	4878	2454	3452	414
Avg. Horz. Error	4.71	5.57	8.11	9.55
Stddev. Horz. Error	6.37	5.69	7.02	9.42
Max. Horz. Error	62.17	58.36	56.6	75.25
Min. Horz. Error	0.01	0.06	0.04	0.11
Avg. Lat. Error	-0.04	-0.15	2.24	0.67
Stddev. Lat. Error	6.15	5.57	8.15	8.75
Max. Lat. Error	60.84	31.18	54.78	42.67
Min. Lat. Error	-39.76	-38.45	-37.58	-43.96
Avg. Abs. Lat. Error	2.55	3.35	4.92	4.96
Stddev. Abs. Lat. Error	5.6	4.45	6.88	7.24
Max. Abs. Lat. Error	60.84	38.45	54.78	43.96
Min. Abs. Lat. Error	0	0	0	0.01
Avg. Long. Error	0.14	0.18	0.84	2.19
Stddev. Long. Error	5	5.69	6.54	9.91
Max. Long. Error	37.39	58.31	30.21	49.55
Min. Long. Error	-31.86	-25.91	-36.79	-61.99
Avg. Abs. Long. Error	2.96	3.54	4.8	6.72
Stddev. Abs. Long. Error	4.03	4.46	4.53	7.6
Max. Abs. Long. Error	37.39	58.31	36.79	61.99
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-17.72	-1885.93	422.37	618.61
Stddev. Vert. Error	1771.44	3465.79	3085.12	6181.16
Max. Vert. Error	17000	17747	29003	28990
Min. Vert. Error	-20550	-19945.7	-14955.2	-14133
Avg. Abs. Vert. Error	517.43	2473.02	1501.08	3263.83
Stddev. Abs. Vert. Error	1694.26	3074.35	2728.1	5283.17
Max. Abs. Vert. Error	20550	19945.74	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.72	5.64	8.14	9.61
Stddev. Slant Range Error	6.37	5.66	7.01	9.42
Max. Slant Range Error	62.17	58.36	56.6	75.4
Min. Slant Range Error	0.01	0.11	0.05	0.23

Figure A.2- 53 Descriptive Statistics for Flight Types at Look Ahead Time of 900 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 1200 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	3806	1595	2511	262
Avg. Horz. Error	6.2	6.48	10.45	13.44
Stddev. Horz. Error	8.27	6.48	8.24	13.19
Max. Horz. Error	78.4	63.92	56.61	86.73
Min. Horz. Error	0.03	0.02	0.01	0.39
Avg. Lat. Error	-0.05	-0.05	2.94	-0.15
Stddev. Lat. Error	7.76	5.95	9.55	10.05
Max. Lat. Error	76.1	26.35	53.39	41.78
Min. Lat. Error	-55.56	-38.88	-49.48	-50.89
Avg. Abs. Lat. Error	3.23	3.59	6.14	5.66
Stddev. Abs. Lat. Error	7.06	4.74	7.88	8.3
Max. Abs. Lat. Error	76.1	38.88	53.39	50.89
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.32	0.19	1.31	3.72
Stddev. Long. Error	6.82	6.97	8.68	15.5
Max. Long. Error	38.33	63.92	44.46	77.59
Min. Long. Error	-40.8	-30.92	-35.88	-85.87
Avg. Abs. Long. Error	4.02	4.39	6.48	10.61
Stddev. Abs. Long. Error	5.52	5.42	5.92	11.88
Max. Abs. Long. Error	40.8	63.92	44.46	85.87
Min. Abs. Long. Error	0	0	0	0.04
Avg. Vert. Error	-26.6	-1946.08	507.25	1082.46
Stddev. Vert. Error	1904.24	3537.6	3196.61	6391.57
Max. Vert. Error	17000	15000	29003	28990
Min. Vert. Error	-17851	-19633	-16708	-11108
Avg. Abs. Vert. Error	588.35	2612.74	1481.99	3343.97
Stddev. Abs. Vert. Error	1811.25	3077.91	2877.25	5550.08
Max. Abs. Vert. Error	17851	19633	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	6.22	6.55	10.46	13.48
Stddev. Slant Range Error	8.27	6.44	8.23	13.19
Max. Slant Range Error	78.4	63.95	56.61	86.86
Min. Slant Range Error	0.03	0.09	0.01	0.49

Figure A.2- 54 Descriptive Statistics for Flight Types at Look Ahead Time of 1200 and Samples at Altitudes Above 18,000 Feet

LOOKAHEAD TIME 1500 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	2917	975	1649	155
Avg. Horz. Error	7.69	7.17	12.36	14.49
Stddev. Horz. Error	10.2	6.29	9.55	13.37
Max. Horz. Error	87.22	39.59	85.79	75.25
Min. Horz. Error	0.03	0.13	0.09	0.74
Avg. Lat. Error	-0.1	-0.15	3.1	-2.24
Stddev. Lat. Error	9.43	6.6	10.56	9.81
Max. Lat. Error	85.67	27.93	67.1	42.67
Min. Lat. Error	-65.63	-38.45	-53.87	-58.18
Avg. Abs. Lat. Error	3.92	3.96	6.88	5.47
Stddev. Abs. Lat. Error	8.57	5.28	8.59	8.44
Max. Abs. Lat. Error	85.67	38.45	67.1	58.18
Min. Abs. Lat. Error	0	0	0	0.02
Avg. Long. Error	0.54	0.35	1.33	3.18
Stddev. Long. Error	8.6	6.88	11	16.69
Max. Long. Error	47.19	39.59	61.01	63.91
Min. Long. Error	-49.89	-26.43	-53.47	-61.99
Avg. Abs. Long. Error	5.04	4.83	8.14	11.85
Stddev. Abs. Long. Error	6.98	4.91	7.52	12.15
Max. Abs. Long. Error	49.89	39.59	61.01	63.91
Min. Abs. Long. Error	0	0	0	0.4
Avg. Vert. Error	-91.11	-1991.53	662.11	540.24
Stddev. Vert. Error	2072.35	3683.8	3089.13	5740.7
Max. Vert. Error	17000	10600	29003	28990
Min. Vert. Error	-20550	-19924.8	-13633	-12269.3
Avg. Abs. Vert. Error	674.7	2779.56	1433.13	3219.4
Stddev. Abs. Vert. Error	1961.52	3131.57	2815.36	4776.77
Max. Abs. Vert. Error	20550	19924.8	29003	28990
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	7.7	7.23	12.37	14.53
Stddev. Slant Range Error	10.19	6.26	9.54	13.37
Max. Slant Range Error	87.23	39.59	85.79	75.4
Min. Slant Range Error	0.03	0.22	0.09	0.74

Figure A.2- 55 Descriptive Statistics for Flight Types at Look Ahead Time of 1500 and Samples All Altitudes Above 18,000 Feet

LOOKAHEAD TIME 1800 Seconds				
Flight type	OVR	ARR	DEP	INR
Sample Quantity	2217	568	1051	76
Avg. Horz. Error	9.14	8.36	13.61	15.31
Stddev. Horz. Error	11.83	7.47	10.03	14.12
Max. Horz. Error	87.65	48.09	77.52	70.24
Min. Horz. Error	0.06	0.03	0.03	0.28
Avg. Lat. Error	0.04	-0.5	3.08	-3.64
Stddev. Lat. Error	10.59	8.21	10.43	9.85
Max. Lat. Error	86.54	26.68	38.98	21.05
Min. Lat. Error	-62.21	-45.06	-54.59	-42.31
Avg. Abs. Lat. Error	4.55	4.86	6.85	6.07
Stddev. Abs. Lat. Error	9.57	6.63	8.44	8.55
Max. Abs. Lat. Error	86.54	45.06	54.59	42.31
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.86	0.83	0.88	-0.09
Stddev. Long. Error	10.52	7.58	12.92	18.07
Max. Long. Error	55.83	44.94	77.47	69.78
Min. Long. Error	-58.65	-26.15	-38.24	-38.11
Avg. Abs. Long. Error	6.11	5.44	9.57	12.14
Stddev. Abs. Long. Error	8.6	5.34	8.73	13.31
Max. Abs. Long. Error	58.65	44.94	77.47	69.78
Min. Abs. Long. Error	0	0	0	0.05
Avg. Vert. Error	-118.67	-2134.48	854.48	954.04
Stddev. Vert. Error	2096.6	4030.35	3332.79	5918.06
Max. Vert. Error	17000	10300	29003	24000
Min. Vert. Error	-17851	-16650	-12600	-11111
Avg. Abs. Vert. Error	724.52	3095.99	1601.06	3628.15
Stddev. Abs. Vert. Error	1970.95	3347.49	3045.08	4754.66
Max. Abs. Vert. Error	17851	16650	29003	24000
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	9.15	8.42	13.63	15.34
Stddev. Slant Range Error	11.83	7.44	10.02	14.12
Max. Slant Range Error	87.65	48.12	77.67	70.29
Min. Slant Range Error	0.06	0.24	0.03	0.28

Figure A.2- 56 Descriptive Statistics for Flight Types at Look Ahead Time of 1800 and Samples at Altitudes Above 18,000 Feet

A.2.2.2 Statistical Tests

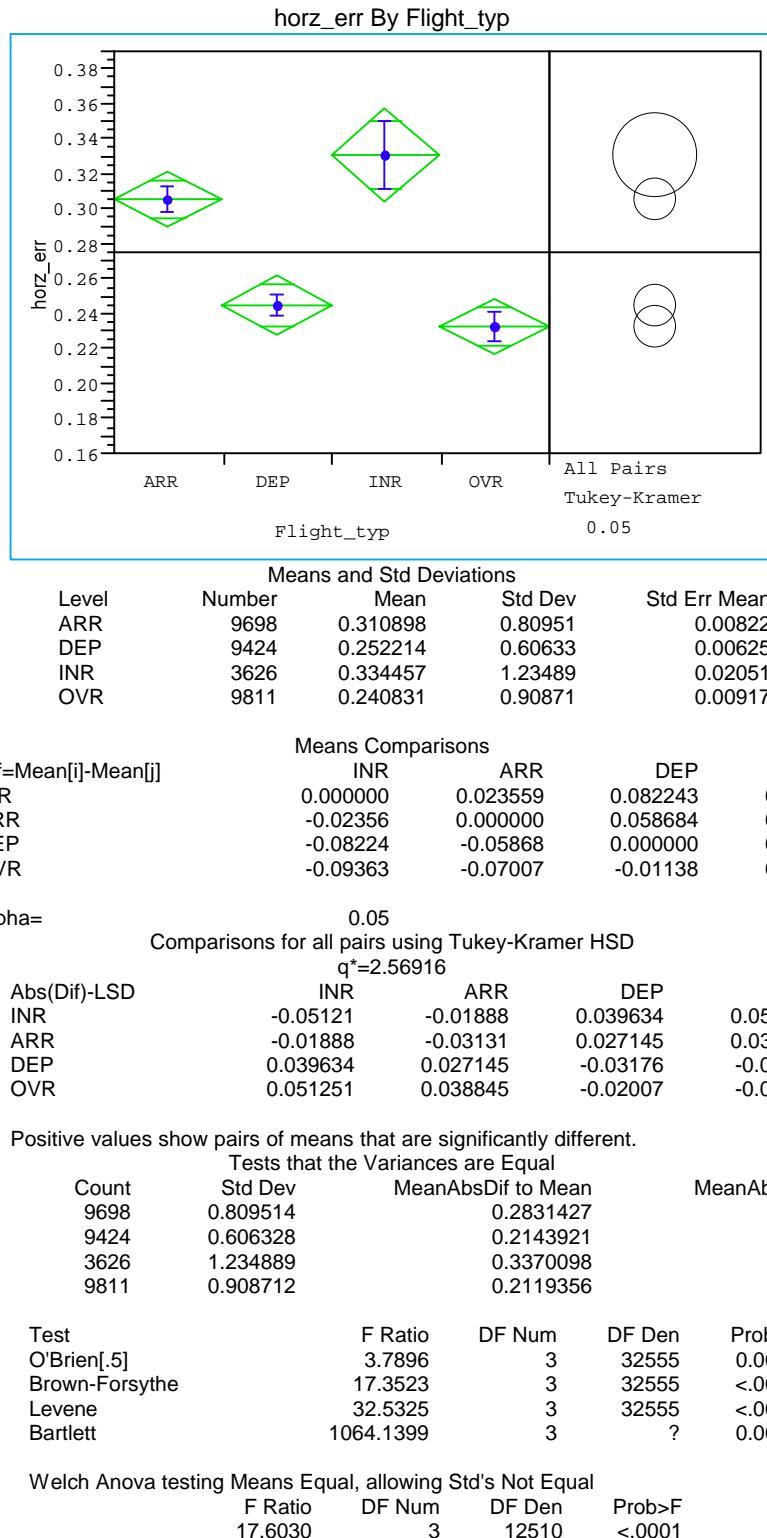
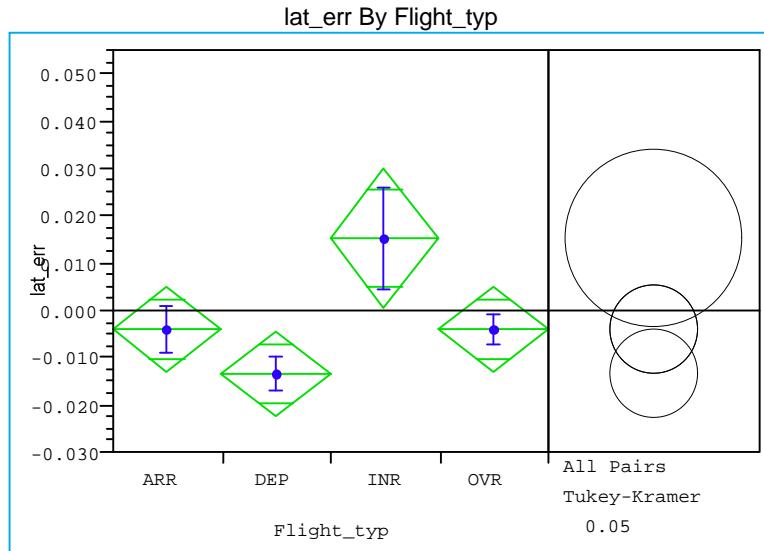


Figure A.2- 57 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	9698	-0.00095	0.519224	0.00527
DEP	9424	-0.01009	0.387463	0.00399
INR	3626	0.018935	0.648047	0.01076
OVR	9811	0.004879	0.344793	0.00348

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	OVR	ARR	DEP
INR	0.000000	0.014056	0.019886	0.029028
OVR	-0.01406	0.000000	0.005830	0.014972
ARR	-0.01989	-0.00583	0.000000	0.009142
DEP	-0.02903	-0.01497	-0.00914	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56916	
Abs(Dif)-LSD	INR
INR	-0.02741
OVR	-0.00863
ARR	-0.00283
DEP	0.006221
INR	OVR
	-0.00863
	-0.01666
	-0.01088
	-0.00186
OVR	ARR
	-0.00283
	-0.01676
	-0.00774
ARR	DEP
	-0.00774
	-0.017

Positive values show pairs of means that are significantly different.

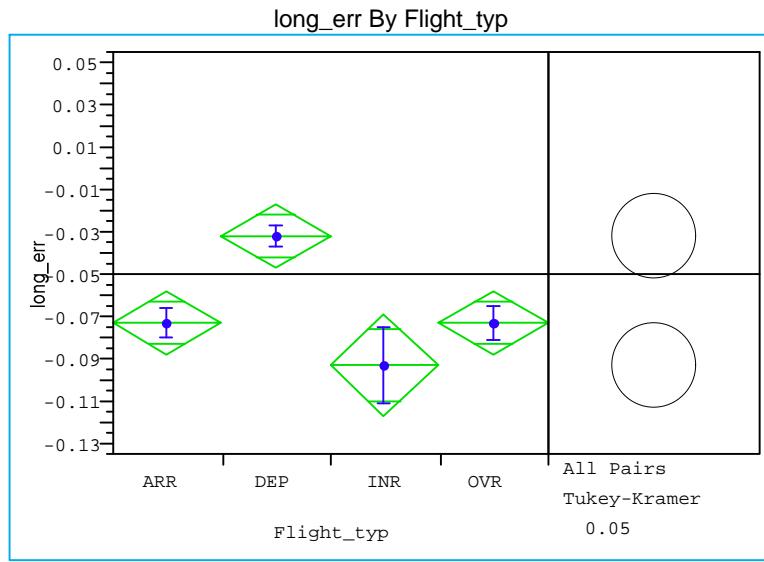
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	9698	0.5192241	0.1598022	0.1598021
DEP	9424	0.3874632	0.1150324	0.1139145
INR	3626	0.6480467	0.1747049	0.1703137
OVR	9811	0.3447934	0.0888259	0.0884648

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.4078	3	32555	0.0042
Brown-Forsythe	58.7598	3	32555	<.0001
Levene	60.5115	3	32555	<.0001
Bartlett	1079.1302	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
3.8104	3	12523	0.0096

Figure A.2- 58 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	9698	-0.05228	0.69257	0.00703
DEP	9424	-0.02979	0.52928	0.00545
INR	3626	-0.0791	1.10012	0.01827
OVR	9811	-0.05522	0.87282	0.00881

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.000000	0.022487	0.025426	0.049301
ARR	-0.02249	0.000000	0.002939	0.026814
OVR	-0.02543	-0.00294	0.000000	0.023875
INR	-0.0493	-0.02681	-0.02388	0.000000

Alpha=	0.05							
Comparisons for all pairs using Tukey-Kramer HSD								
$q^*=2.56916$								
Abs(Dif)-LSD	DEP	ARR	OVR	INR				
DEP	-0.02871	-0.00602	-0.003	0.010793				
ARR	-0.00602	-0.0283	-0.02528	-0.01154				
OVR	-0.003	-0.02528	-0.02813	-0.01442				
INR	0.010793	-0.01154	-0.01442	-0.04628				

Positive values show pairs of means that are significantly different.

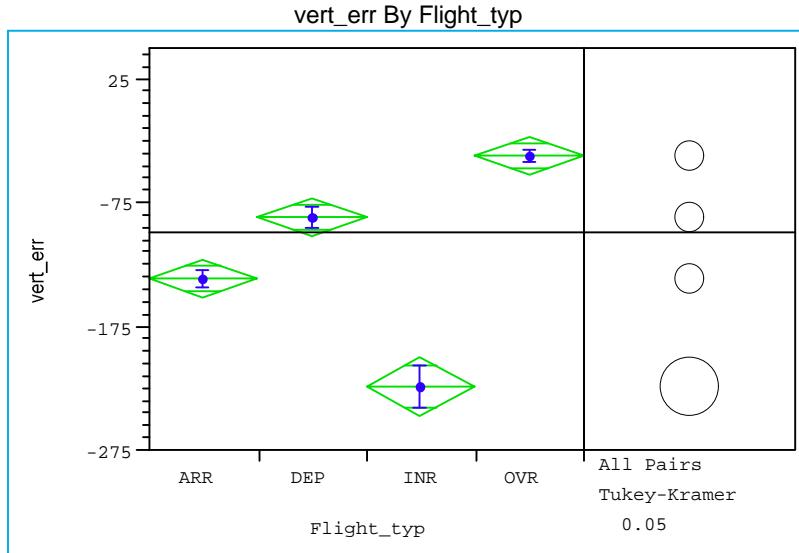
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	9698	0.692568	0.2154040	0.2153890
DEP	9424	0.529277	0.1871705	0.1865599
INR	3626	1.100120	0.2469661	0.2427026
OVR	9811	0.872815	0.1980230	0.1969770

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.3723	3	32555	0.0176
Brown-Forsythe	6.1180	3	32555	0.0004
Levene	6.6584	3	32555	0.0002
Bartlett	1273.2348	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
4.4776	3	12473	0.0038

Figure A.2- 59 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 0 for Samples at All Altitudes



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
ARR	9698	-136.853	767.97	7.798
DEP	9424	-86.469	839.17	8.644
INR	3626	-223.639	1035.82	17.202
OVR	9811	-26.653	628.20	6.342

Dif=Mean[i]-Mean[j]	Means Comparisons			
	OVR	DEP	ARR	INR
OVR	0.000	59.817	110.200	196.987
DEP	-59.817	0.000	50.383	137.170
ARR	-110.200	-50.383	0.000	86.787
INR	-196.987	-137.170	-86.787	0.000

Alpha=	Comparisons for all pairs using Tukey-Kramer HSD			
	q*=2.56916			
Abs(Dif)-LSD	OVR	DEP	ARR	INR
OVR	-28.834	30.688	81.282	157.738
DEP	30.688	-29.420	21.171	97.704
ARR	81.282	21.171	-29.002	47.476
INR	157.738	97.704	47.476	-47.430

Positive values show pairs of means that are significantly different.

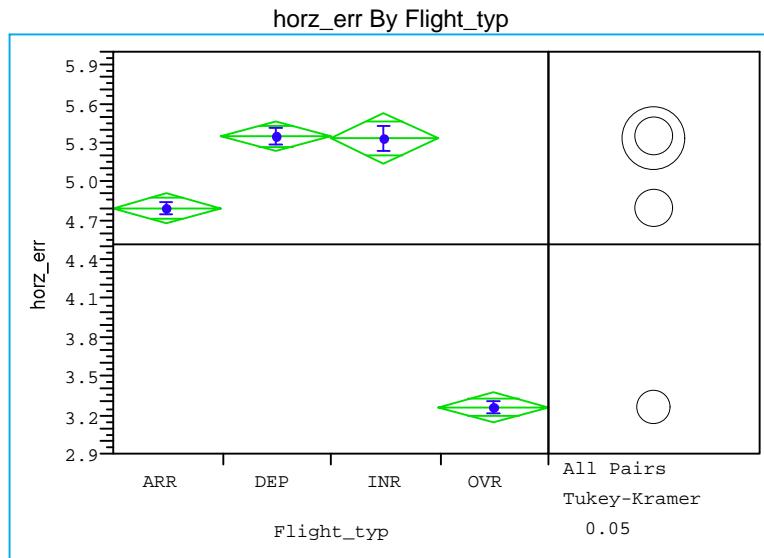
Level	Count	Std Dev	Tests that the Variances are Equal		MeanAbsdif to Median
			MeanAbsdif to Mean	MeanAbsdif to Median	
ARR	9698	767.970	249.2032		187.8927
DEP	9424	839.169	185.1839		147.8805
INR	3626	1035.819	405.3568		319.9138
OVR	9811	628.197	85.1985		64.7526

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.6194	3	32555	0.0491
Brown-Forsythe	104.9176	3	32555	<.0001
Levene	180.2678	3	32555	<.0001
Bartlett	539.1360	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
64.5361	3	12695	<.0001

Figure A.2- 60 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	6410	4.81263	4.72863	0.05906
DEP	6127	5.35402	5.48387	0.07006
INR	2378	5.33299	4.88957	0.10027
OVR	6964	3.26441	4.40919	0.05284

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	ARR	OVR
DEP	0.00000	0.02103	0.54139	2.08961
INR	-0.02103	0.00000	0.52036	2.06858
ARR	-0.54139	-0.52036	0.00000	1.54822
OVR	-2.08961	-2.06858	-1.54822	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56923	
Abs(Dif)-LSD	
DEP	-0.22626
INR	-0.28154
ARR	0.31765
OVR	1.87026
DEP	-0.28154
INR	0.21967
ARR	-0.22121
OVR	1.77114
DEP	0.21967
INR	1.33145
ARR	-0.22121
OVR	-0.21223

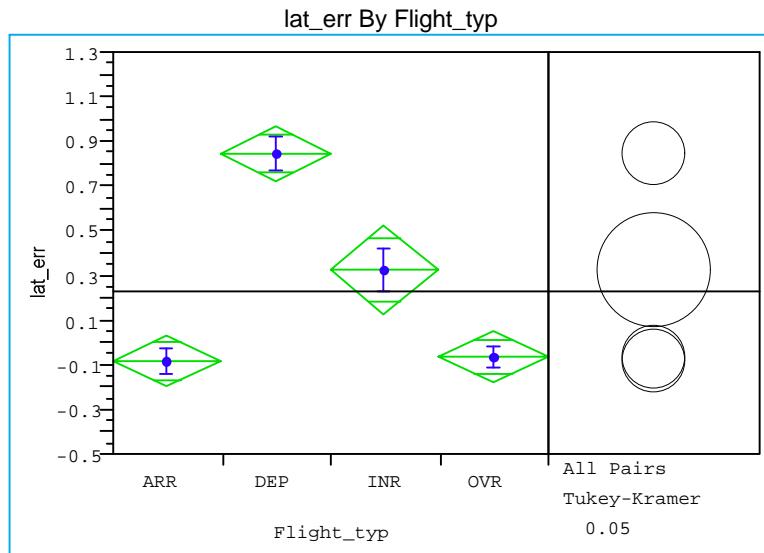
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	Mean	AbsDif to Median
ARR	6410	4.728632	3.305763	3.089800
DEP	6127	5.483868	3.923596	3.670080
INR	2378	4.889567	3.525267	3.368692
OVR	6964	4.409194	2.758096	2.388764

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	14.9169	3	21875	<.0001
Brown-Forsythe	114.0037	3	21875	<.0001
Levene	121.0969	3	21875	<.0001
Bartlett	109.0100	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	260.8810	3	8784.1	<.0001

Figure A.2- 61 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	6410	-0.07385	4.88907	0.06107
DEP	6127	0.855664	5.95637	0.07610
INR	2378	0.333792	4.82253	0.09889
OVR	6964	-0.05715	4.22934	0.05068

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	INR	OVR	ARR
DEP	0.000000	0.521872	0.912819	0.929514
INR	-0.52187	0.000000	0.390947	0.407642
OVR	-0.91282	-0.39095	0.000000	0.016695
ARR	-0.92951	-0.40764	-0.0167	0.000000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56923

Abs(Dif)-LSD	DEP	INR	OVR	ARR
DEP	-0.23283	0.210513	0.687090	0.699265
INR	0.210513	-0.37373	0.084864	0.098211
OVR	0.687090	0.084864	-0.21839	-0.20637
ARR	0.699265	0.098211	-0.20637	-0.22764

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

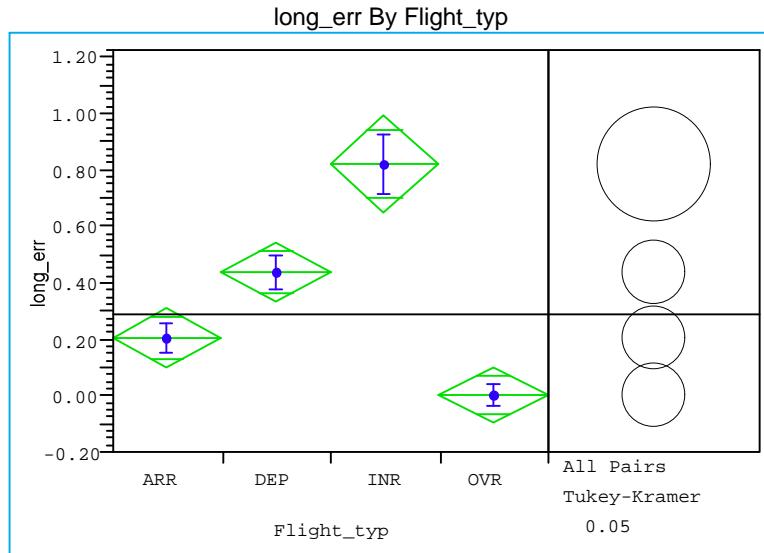
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	6410	4.889072	2.926194	2.925056
DEP	6127	5.956371	3.489681	3.283112
INR	2378	4.822525	2.801543	2.776986
OVR	6964	4.229340	1.815585	1.814337

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	42.1508	3	21875	<.0001
Brown-Forsythe	145.6878	3	21875	<.0001
Levene	184.8489	3	21875	<.0001
Bartlett	261.7352	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
39.8590	3	8775.4	<.0001

Figure A.2- 62 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	6410	0.233064	4.64351	0.05800
DEP	6127	0.462771	4.72422	0.06035
INR	2378	0.821925	5.32133	0.10912
OVR	6964	0.021720	3.49397	0.04187

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.000000	0.359155	0.588861	0.800205
DEP	-0.35915	0.000000	0.229706	0.441050
ARR	-0.58886	-0.22971	0.000000	0.211344
OVR	-0.80021	-0.44105	-0.21134	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56923	
Abs(Dif)-LSD	INR
INR	-0.32928
DEP	0.084830
ARR	0.316235
OVR	0.530529
INR	DEP
DEP	-0.20514
ARR	0.026844
OVR	0.242171
ARR	ARR
ARR	-0.20056
OVR	0.014814
OVR	OVR
OVR	-0.19242

Positive values show pairs of means that are significantly different.

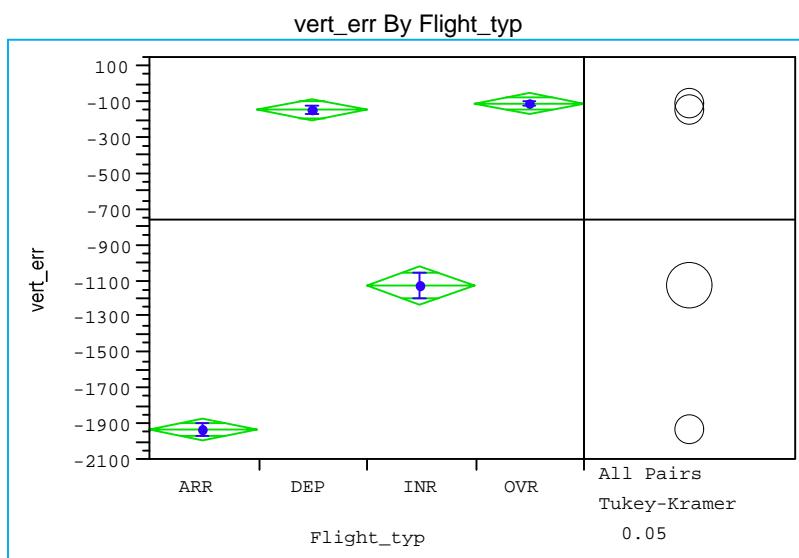
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	6410	4.643507	3.004258	3.001655
DEP	6127	4.724217	3.200885	3.188288
INR	2378	5.321330	3.635635	3.623661
OVR	6964	3.493972	2.043733	2.043354

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	39.2139	3	21875	<.0001
Brown-Forsythe	199.5752	3	21875	<.0001
Levene	204.0091	3	21875	<.0001
Bartlett	312.3250	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
23.0074	3	8417.5	<.0001

Figure A.2- 63 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	6410	-1923.41	3217.90	40.192	
DEP	6127	-140.57	2691.21	34.381	
INR	2378	-1127.88	3808.73	78.104	
OVR	6964	-106.29	1577.38	18.902	

Means Comparisons				
Dif=Mean[i]-Mean[j]	OVR	DEP	INR	ARR
OVR	0.00	34.29	1021.59	1817.13
DEP	-34.29	0.00	987.31	1782.84
INR	-1021.59	-987.31	0.00	795.53
ARR	-1817.13	-1782.84	-795.53	0.00

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
q*=2.56923				
Abs(Dif)-LSD	OVR	DEP	INR	ARR
OVR	-118.68	-88.38	855.26	1695.90
DEP	-88.38	-126.53	818.10	1657.71
INR	855.26	818.10	-203.10	627.37
ARR	1695.90	1657.71	627.37	-123.71

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

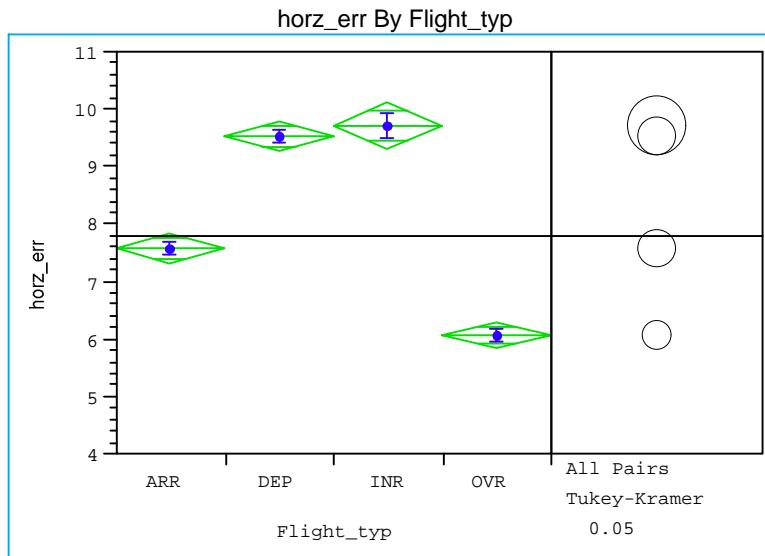
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	6410	3217.898	2405.257	2306.734
DEP	6127	2691.211	1453.928	1395.545
INR	2378	3808.727	2535.934	2398.314
OVR	6964	1577.378	556.658	476.562

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	168.1225	3	21875	<.0001
Brown-Forsythe	886.3388	3	21875	0.0000
Levene	1068.1096	3	21875	0.0000
Bartlett	1352.3183	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
607.1591	3	7913.5	0.0000

Figure A.2- 64 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 600 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	3585	7.57846	7.04364	0.11764
DEP	3426	9.57077	8.45039	0.14437
INR	1411	9.71904	9.14956	0.24358
OVR	4484	6.08676	7.91783	0.11824

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.00000	0.14828	2.14058	3.63229
DEP	-0.14828	0.00000	1.99231	3.48401
ARR	-2.14058	-1.99231	0.00000	1.49171
OVR	-3.63229	-3.48401	-1.49171	0.00000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56937

Abs(Dif)-LSD	INR	DEP	ARR	OVR
INR	-0.77187	-0.50025	1.49627	3.00648
DEP	-0.50025	-0.49535	1.50247	3.01879
ARR	1.49627	1.50247	-0.48424	1.03237
OVR	3.00648	3.01879	1.03237	-0.43299

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

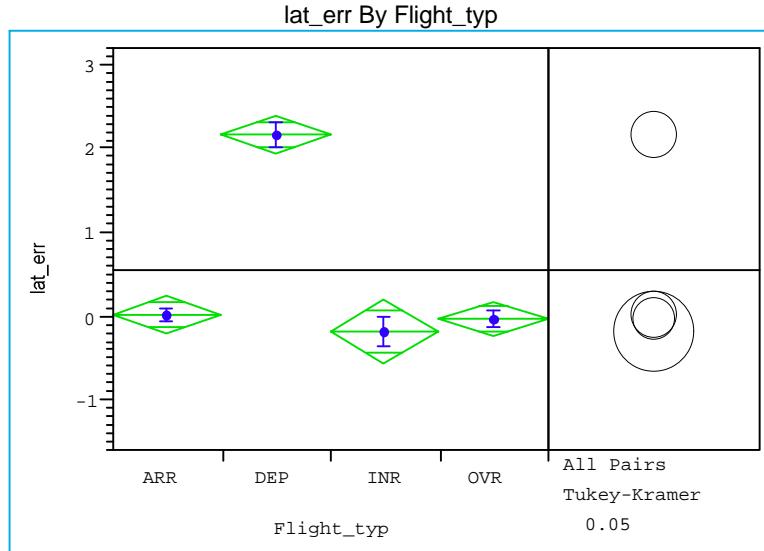
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3585	7.043636	5.184324	4.855789
DEP	3426	8.450394	6.336549	6.114365
INR	1411	9.149565	6.393235	6.153383
OVR	4484	7.917826	5.075809	4.439521

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	9.1732	3	12902	<.0001
Brown-Forsythe	56.5756	3	12902	<.0001
Levene	47.6911	3	12902	<.0001
Bartlett	61.5680	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
141.2398	3	5061.2	<.0001

Figure A.2- 65 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	3585	0.01866	5.92363	0.09893
DEP	3426	2.18014	8.90710	0.15217
INR	1411	-0.15311	6.78403	0.18060
OVR	4484	-0.01506	7.37213	0.11009

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.00000	2.16148	2.19520	2.33325
ARR	-2.16148	0.00000	0.03372	0.17177
OVR	-2.19520	-0.03372	0.00000	0.13804
INR	-2.33325	-0.17177	-0.13804	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56937	
Abs(Dif)-LSD	
DEP	-0.45923
ARR	1.70737
OVR	1.76391
INR	1.73202
DEP	1.70737
ARR	-0.44893
OVR	-0.39211
INR	-0.40141
DEP	1.76391
ARR	-0.39211
OVR	-0.40141
INR	-0.44212
DEP	1.73202
ARR	-0.42556
OVR	-0.44212
INR	-0.71558

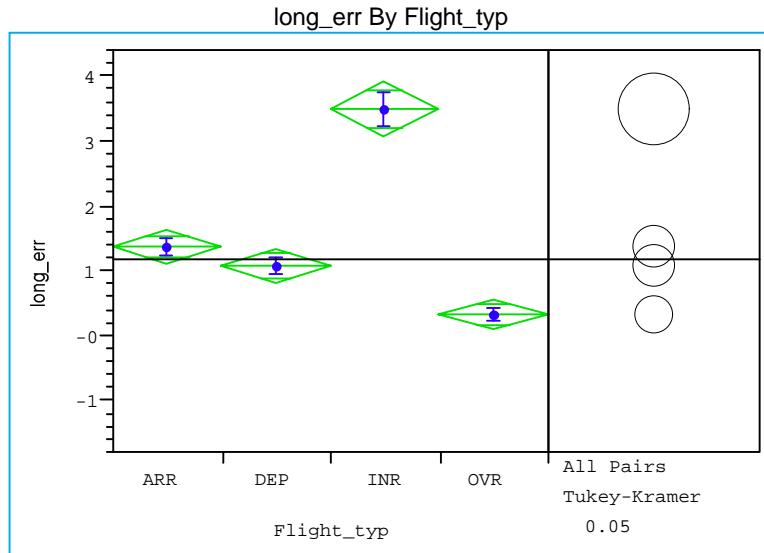
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3585	5.923634	3.528745	3.527918
DEP	3426	8.907101	5.855866	5.388564
INR	1411	6.784031	3.895724	3.882217
OVR	4484	7.372126	3.109415	3.108946

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	27.2043	3	12902	<.0001
Brown-Forsythe	91.5585	3	12902	<.0001
Levene	144.9279	3	12902	<.0001
Bartlett	198.3974	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	58.1885	3	5213.7	<.0001

Figure A.2- 66 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	3585	1.38903	8.3691	0.13978
DEP	3426	1.12294	8.8138	0.15058
INR	1411	3.54592	10.9367	0.29116
OVR	4484	0.36605	6.7280	0.10047

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	ARR	DEP	OVR
INR	0.00000	2.15689	2.42298	3.17987
ARR	-2.15689	0.00000	0.26609	1.02298
DEP	-2.42298	-0.26609	0.00000	0.75689
OVR	-3.17987	-1.02298	-0.75689	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56937	
Abs(Dif)-LSD	
INR	-0.80283
ARR	1.48674
DEP	1.74845
OVR	2.52897
INR	1.48674
ARR	-0.50366
DEP	-0.24338
OVR	0.54523
INR	1.74845
ARR	-0.24338
DEP	-0.51522
OVR	0.27301
INR	2.52897
ARR	0.54523
DEP	0.27301
OVR	-0.45035

Positive values show pairs of means that are significantly different.

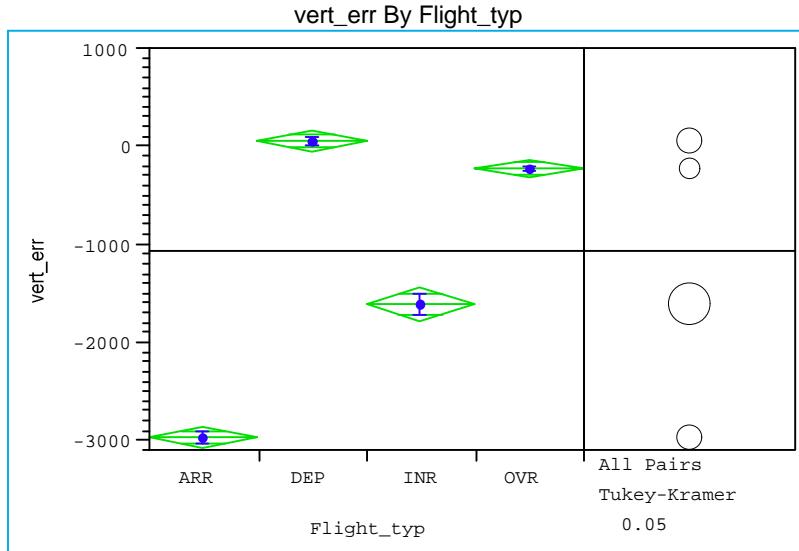
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3585	8.36912	5.518321	5.514633
DEP	3426	8.81381	6.217601	6.192209
INR	1411	10.93674	7.593686	7.471313
OVR	4484	6.72803	4.027240	4.026134

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	40.8904	3	12902	<.0001
Brown-Forsythe	143.3800	3	12902	<.0001
Levene	153.3512	3	12902	<.0001
Bartlett	210.5479	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
41.4609	3	4860.8	<.0001

Figure A.2- 67 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	3585	-2970.29	4031.85	67.34	
DEP	3426	68.13	3271.64	55.89	
INR	1411	-1597.06	4499.37	119.78	
OVR	4484	-209.47	2166.89	32.36	

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	INR	ARR
DEP	0.00	277.60	1665.19	3038.43
OVR	-277.60	0.00	1387.59	2760.83
INR	-1665.19	-1387.59	0.00	1373.23
ARR	-3038.43	-2760.83	-1373.23	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56937	
Abs(Dif)-LSD	DEP
DEP	-207.77
OVR	82.48
INR	-1393.18
ARR	2832.98
	OVR
DEP	82.48
OVR	-181.61
INR	1125.11
ARR	2568.17
	INR
DEP	1393.18
OVR	-323.75
INR	1102.99
ARR	-203.11
	ARR
DEP	2832.98
OVR	1102.99
INR	-203.11
ARR	0.00

Positive values show pairs of means that are significantly different.

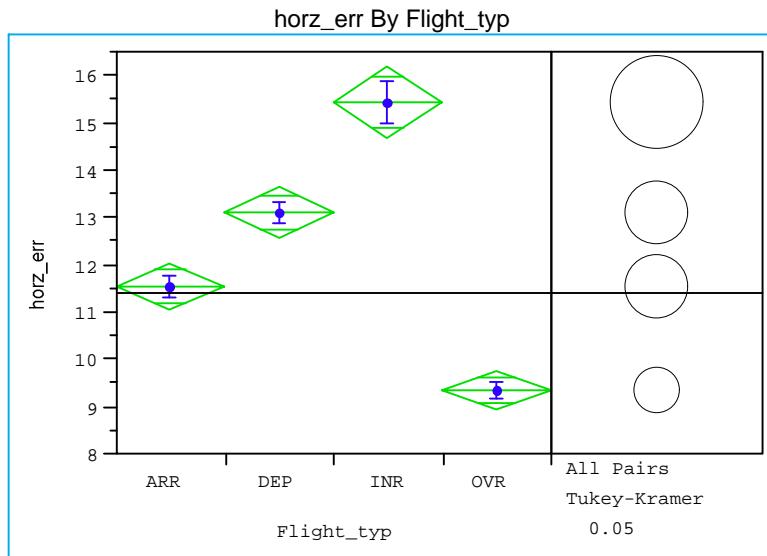
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	3585	4031.854	3023.812	2970.805	
DEP	3426	3271.645	1573.212	1542.725	
INR	1411	4499.375	3116.725	2998.359	
OVR	4484	2166.889	868.074	711.378	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	87.0695	3	12902	<.0001
Brown-Forsythe	564.8393	3	12902	0.0000
Levene	586.7886	3	12902	0.0000
Bartlett	627.8118	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
532.1272	3	4663.8	<.0001

Figure A.2- 68 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	1634	11.0198	10.4753	0.25914
DEP	1567	12.6005	10.4800	0.26474
INR	737	14.9629	12.9118	0.47561
OVR	2714	8.8507	11.1183	0.21342

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.00000	2.36246	3.94317	6.11220
DEP	-2.36246	0.00000	1.58071	3.74974
ARR	-3.94317	-1.58071	0.00000	2.16903
OVR	-6.11220	-3.74974	-2.16903	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56968	
Abs(Dif)-LSD	
INR	-1.47693
DEP	1.09612
ARR	2.68516
OVR	4.93456
INR	1.09612
DEP	-1.01288
ARR	0.57826
OVR	2.85022
INR	2.68516
DEP	-0.99190
ARR	1.28128
OVR	-0.76964

Positive values show pairs of means that are significantly different.

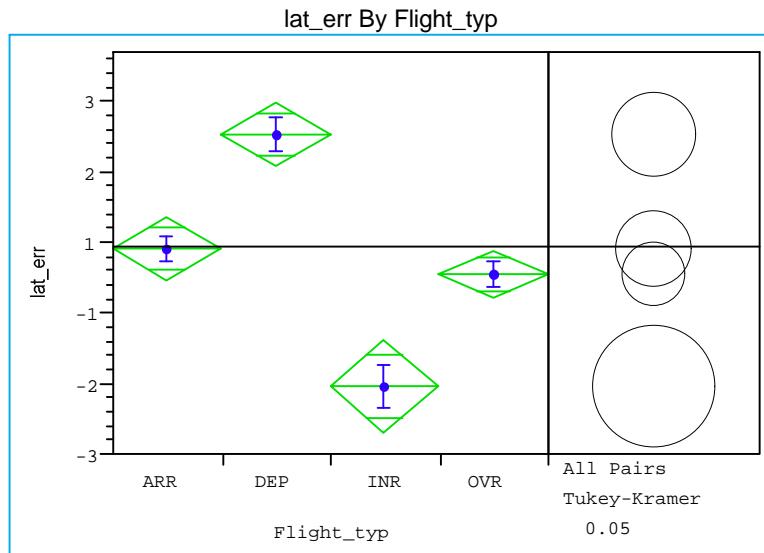
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1634	10.47529	7.977267	7.289042
DEP	1567	10.47996	8.039309	7.820326
INR	737	12.91176	9.922220	9.620093
OVR	2714	11.11833	7.250634	6.396928

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.7179	3	6648	0.0027
Brown-Forsythe	27.5631	3	6648	<.0001
Levene	23.9272	3	6648	<.0001
Bartlett	19.1123	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
68.8395	3	2542.8	<.0001

Figure A.2- 69 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	1634	0.46028	8.0212	0.19843
DEP	1567	2.07270	10.0917	0.25493
INR	737	-1.50990	8.3800	0.30868
OVR	2714	0.05156	9.8547	0.18916

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.00000	1.61242	2.02115	3.58260
ARR	-1.61242	0.00000	0.40873	1.97018
OVR	-2.02115	-0.40873	0.00000	1.56145
INR	-3.58260	-1.97018	-1.56145	0.00000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD	DEP	ARR	OVR	INR
DEP	-0.85727	0.76398	1.25982	2.51080
ARR	0.76398	-0.83951	-0.34264	0.90543
OVR	1.25982	-0.34264	-0.65140	0.56473
INR	2.51080	0.90543	0.56473	-1.25003

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1634	8.02125	4.673304	4.643139
DEP	1567	10.09165	6.382374	6.034568
INR	737	8.38002	5.275666	5.083819
OVR	2714	9.85469	4.269839	4.258889

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.3364	3	6648	0.0046
Brown-Forsythe	16.9347	3	6648	<.0001
Levene	25.2209	3	6648	<.0001
Bartlett	40.1958	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
28.2321	3	2667.7	<.0001

Figure A.2- 70 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 1800 for Samples at All Altitudes

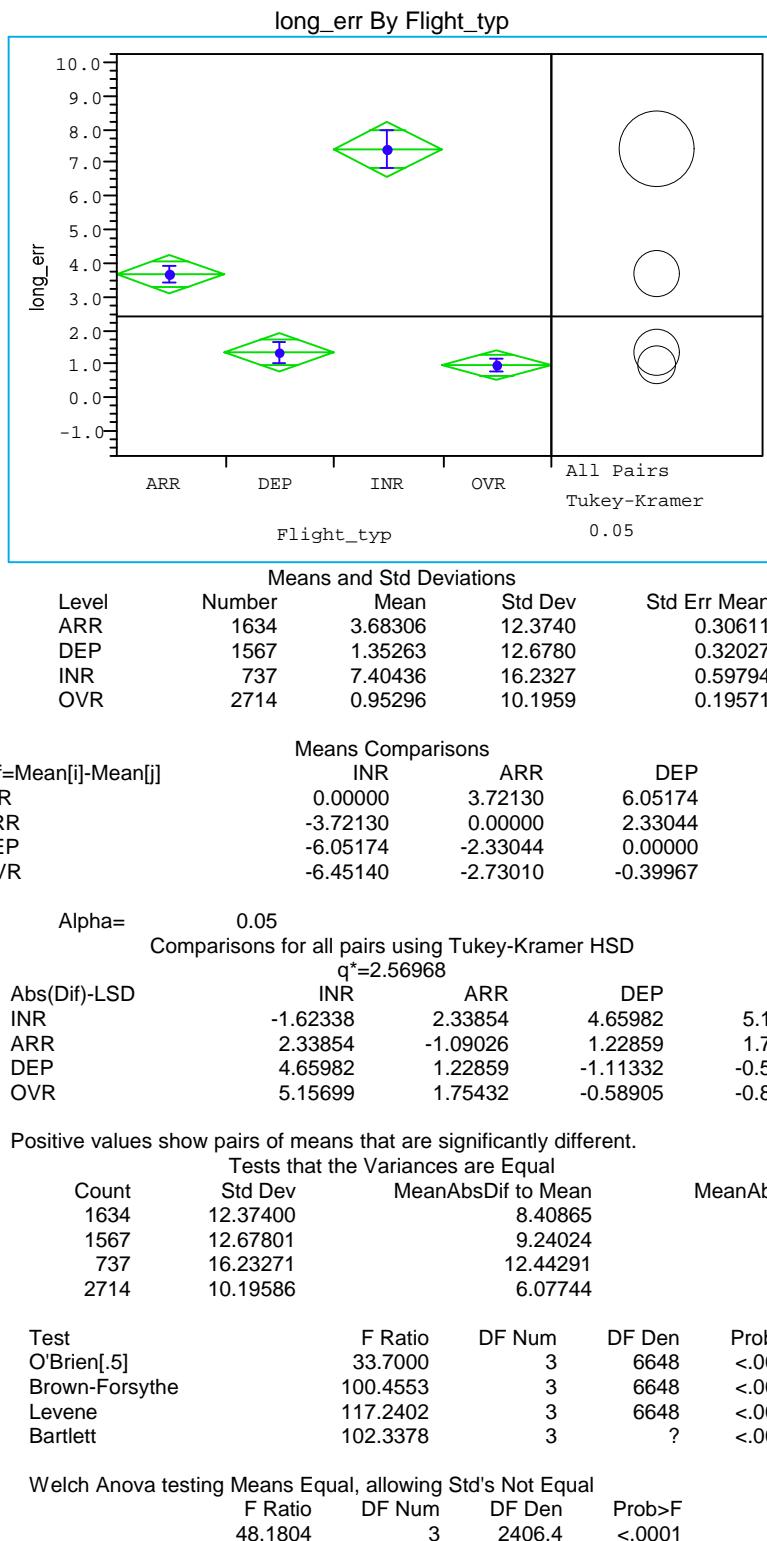
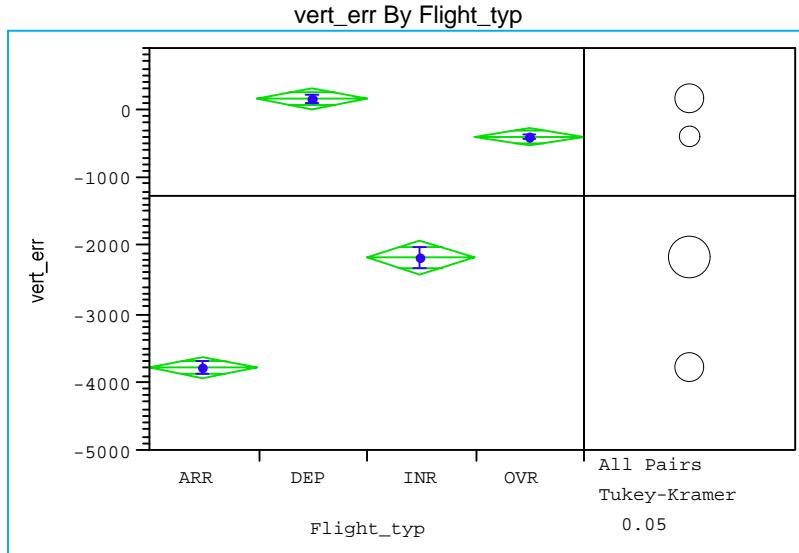


Figure A.2- 71 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	1634	-3766.65	4706.02	116.42	
DEP	1567	189.57	3381.19	85.42	
INR	737	-2143.80	4302.90	158.50	
OVR	2714	-366.26	2399.37	46.06	

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	INR	ARR
DEP	0.00	555.83	2333.37	3956.22
OVR	-555.83	0.00	1777.53	3400.39
INR	-2333.37	-1777.53	0.00	1622.86
ARR	-3956.22	-3400.39	-1622.86	0.00

Alpha=	0.05	Comparisons for all pairs using Tukey-Kramer HSD			
					q*=2.56968
Abs(Dif)-LSD		DEP	OVR	INR	ARR
DEP	-324.99	267.21	1927.05	3634.58	
OVR	267.21	-246.95	1399.68	3115.54	
INR	1927.05	1399.68	-473.89	1219.21	
ARR	3634.58	3115.54	1219.21	-318.26	

Positive values show pairs of means that are significantly different.

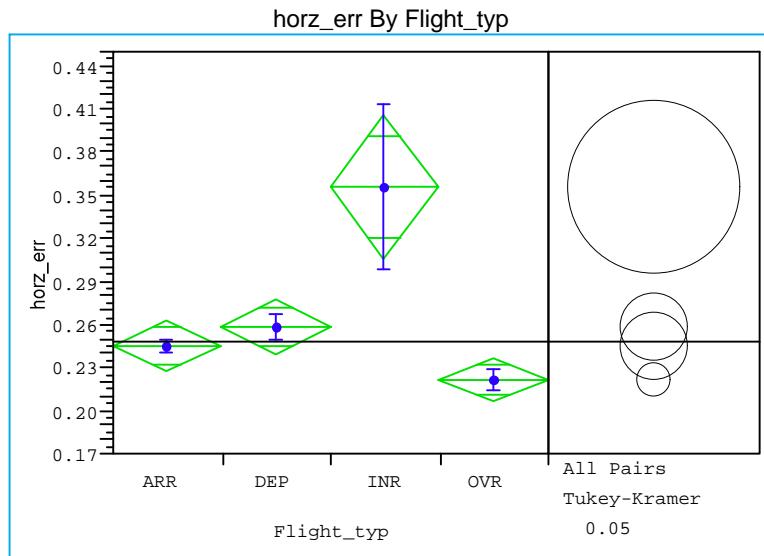
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	1634	4706.017	3575.081	3503.073	
DEP	1567	3381.185	1742.939	1655.000	
INR	737	4302.898	3332.569	3279.080	
OVR	2714	2399.368	1148.947	888.459	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	70.8944	3	6648	<.0001
Brown-Forsythe	362.5704	3	6648	<.0001
Levene	353.6240	3	6648	<.0001
Bartlett	345.6304	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
312.4145	3	2303.9	<.0001

Figure A.2- 72 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 1800 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5944	0.249427	0.43739	0.00567
DEP	5764	0.259489	0.68793	0.00906
INR	835	0.363337	1.68238	0.05822
OVR	8622	0.230576	0.81969	0.00883

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.000000	0.103849	0.113911	0.132762
DEP	-0.10385	0.000000	0.010062	0.028913
ARR	-0.11391	-0.01006	0.000000	0.018851
OVR	-0.13276	-0.02891	-0.01885	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^*=2.56924$	
Abs(Dif)-LSD	
INR	-0.09476
DEP	0.032156
ARR	0.042356
OVR	0.062589
INR	0.032156
DEP	-0.03607
ARR	-0.02573
OVR	-0.00403
INR	0.042356
DEP	-0.02573
ARR	-0.03552
OVR	-0.01379
INR	0.062589
DEP	-0.00403
ARR	-0.01379
OVR	-0.02949

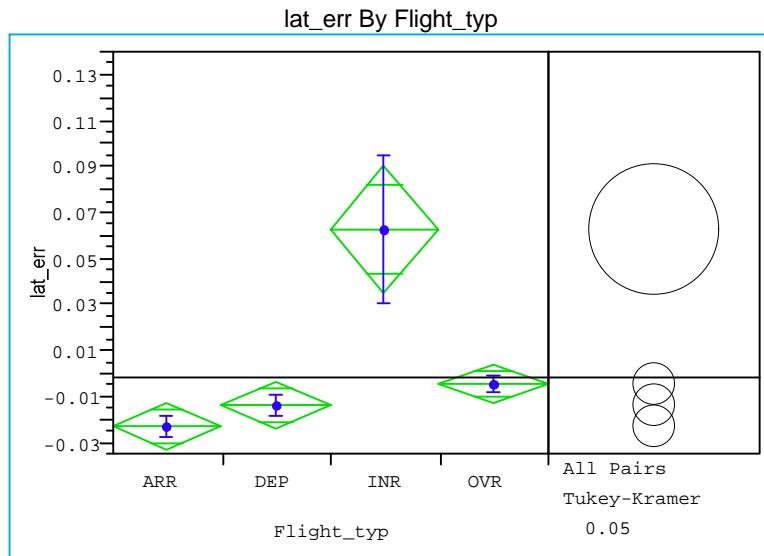
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5944	0.437388	0.1974596	0.1709650
DEP	5764	0.687929	0.2286337	0.1871776
INR	835	1.682376	0.3835806	0.2871825
OVR	8622	0.819693	0.1917282	0.1610402

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.3325	3	21161	0.0047
Brown-Forsythe	7.9475	3	21161	<.0001
Levene	19.7693	3	21161	<.0001
Bartlett	1575.5952	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob>F	
3.1625	3	3581	0.0236	

Figure A.2- 73 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5944	-0.01575	0.380916	0.00494
DEP	5764	-0.00519	0.396285	0.00522
INR	835	0.070869	0.942112	0.03260
OVR	8622	0.004471	0.352300	0.00379

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	OVR	DEP	ARR
INR	0.000000	0.066398	0.076054	0.086623
OVR	-0.0664	0.000000	0.009656	0.020225
DEP	-0.07605	-0.00966	0.000000	0.010569
ARR	-0.08662	-0.02022	-0.01057	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^*=2.56924$	
Abs(Dif)-LSD	
INR	-0.0517
OVR	0.028110
DEP	0.036937
ARR	0.047581
INR	0.028110
OVR	-0.01609
DEP	-0.00832
ARR	-0.002415
INR	0.036937
OVR	-0.00832
DEP	-0.01968
ARR	-0.00896
INR	0.047581
OVR	0.002415
DEP	-0.00896
ARR	-0.01938

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

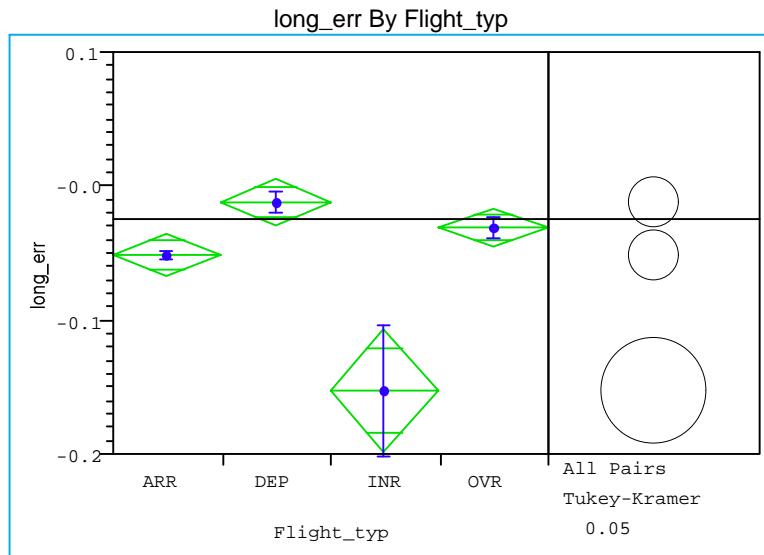
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5944	0.3809155	0.1353706	0.1336314
DEP	5764	0.3962852	0.1079425	0.1074727
INR	835	0.9421121	0.2163070	0.1859559
OVR	8622	0.3523004	0.0859581	0.0856526

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	6.2767	3	21161	0.0003
Brown-Forsythe	28.1942	3	21161	<.0001
Levene	39.0256	3	21161	<.0001
Bartlett	871.5923	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
5.2806	3	3564.4	0.0012

Figure A.2- 74 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5944	-0.06046	0.32331	0.00419
DEP	5764	-0.01901	0.61900	0.00815
INR	835	-0.16516	1.42921	0.04946
OVR	8622	-0.03915	0.77421	0.00834

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	ARR	INR
DEP	0.000000	0.020141	0.041445	0.146146
OVR	-0.02014	0.000000	0.021304	0.126005
ARR	-0.04145	-0.0213	0.000000	0.104701
INR	-0.14615	-0.12601	-0.1047	0.000000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56924

Abs(Dif)-LSD	DEP	OVR	ARR	INR
DEP	-0.0324	-0.00945	0.009289	0.081735
OVR	-0.00945	-0.02649	-0.00802	0.062959
ARR	0.009289	-0.00802	-0.03191	0.040413
INR	0.081735	0.062959	0.040413	-0.08513

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

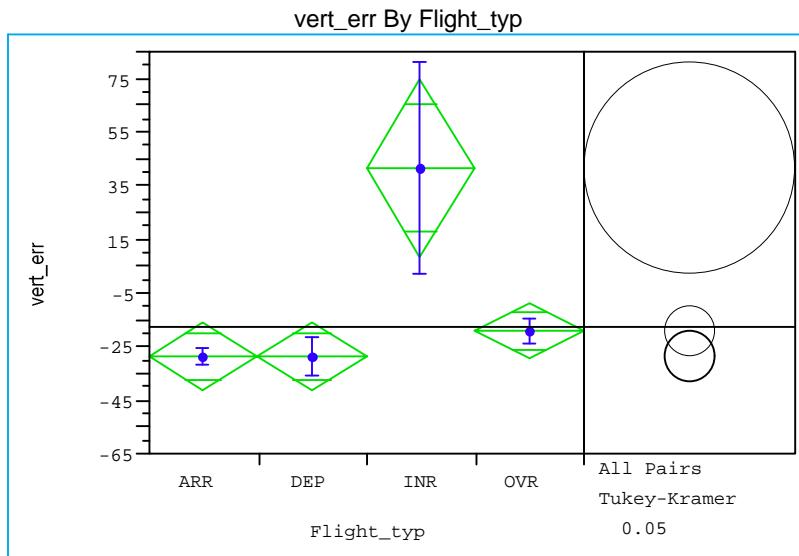
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5944	0.323314	0.1660477	0.1660012
DEP	5764	0.619000	0.2004258	0.1987010
INR	835	1.429214	0.2944851	0.2584907
OVR	8622	0.774209	0.1874689	0.1874689

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.0122	3	21161	0.0288
Brown-Forsythe	6.0415	3	21161	0.0004
Levene	10.4225	3	21161	<.0001
Bartlett	2086.4954	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
9.2540	3	3553.9	<.0001

Figure A.2- 75 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	5944	-28.3424	251.04	3.256
DEP	5764	-27.1060	560.78	7.386
INR	835	42.8403	1163.20	40.254
OVR	8622	-9.5214	478.37	5.152

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	OVR	DEP	ARR
INR	0.0000	52.3618	69.9463	71.1827
OVR	-52.3618	0.0000	17.5846	18.8210
DEP	-69.9463	-17.5846	0.0000	1.2364
ARR	-71.1827	-18.8210	-1.2364	0.0000

Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
$q^*=2.56924$				
Abs(Dif)-LSD	INR	OVR	DEP	ARR
INR	-62.8573	5.8124	22.3889	23.7165
OVR	5.8124	-19.5612	-4.2673	-2.8317
DEP	22.3889	-4.2673	-23.9242	-22.5060
ARR	23.7165	-2.8317	-22.5060	-23.5592

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

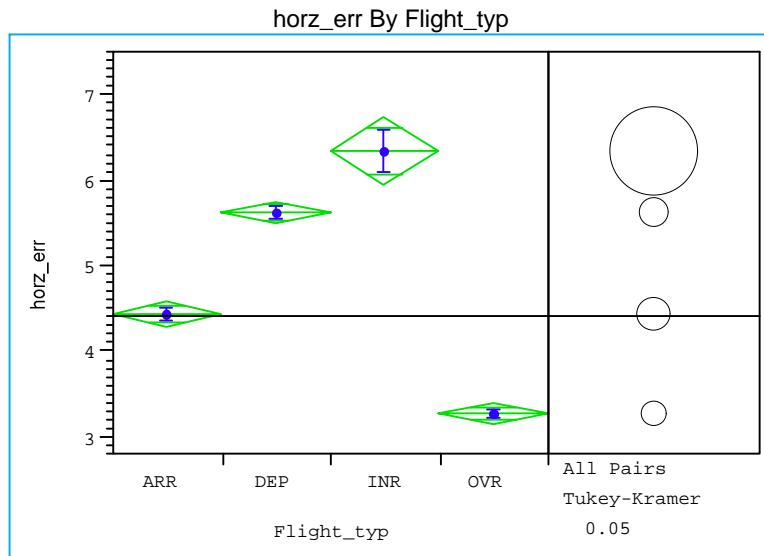
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	5944	251.036	91.8604	76.8985
DEP	5764	560.777	109.4045	94.6887
INR	835	1163.204	202.7138	174.8613
OVR	8622	478.370	52.4152	44.6426

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	9.5397	3	21161	<.0001
Brown-Forsythe	25.0949	3	21161	<.0001
Levene	33.7265	3	21161	<.0001
Bartlett	2070.5746	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
4.1701	3	3540.6	0.0059

Figure A.2- 76 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	3524	4.44700	4.82992	0.08136
DEP	4601	5.63019	5.62203	0.08288
INR	587	6.35718	6.42001	0.26498
OVR	6069	3.28254	4.53168	0.05817

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.00000	0.72699	1.91018	3.07464
DEP	-0.72699	0.00000	1.18319	2.34765
ARR	-1.91018	-1.18319	0.00000	1.16446
OVR	-3.07464	-2.34765	-1.16446	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56932	
Abs(Dif)-LSD	
INR	-0.75686
DEP	0.15870
ARR	1.33214
OVR	2.51418
INR	0.15870
DEP	-0.27034
ARR	0.89293
OVR	2.09419
INR	1.33214
DEP	-0.30890
ARR	0.88985
OVR	-0.23538

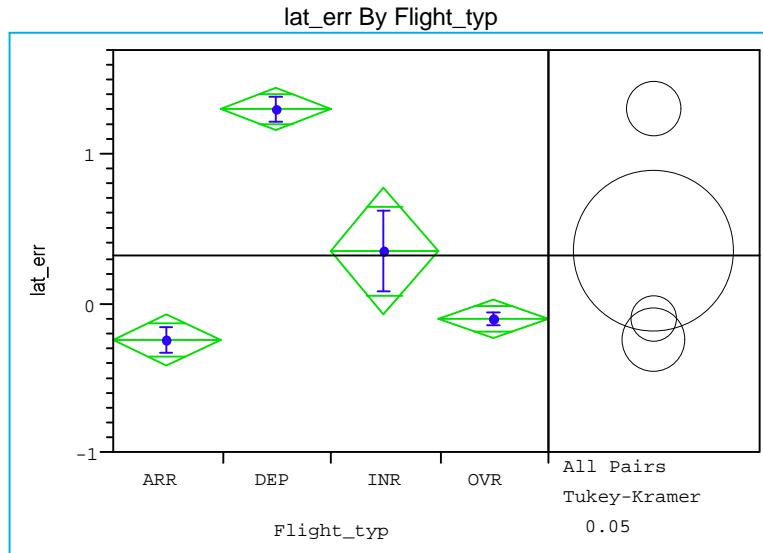
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3524	4.829923	3.172503	2.900904
DEP	4601	5.622026	4.056605	3.814293
INR	587	6.420010	4.724777	4.247451
OVR	6069	4.531681	2.816014	2.423076

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	16.4402	3	14777	<.0001
Brown-Forsythe	108.2161	3	14777	<.0001
Levene	126.7033	3	14777	<.0001
Bartlett	113.2546	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	207.2099	3	2556	<.0001

Figure A.2- 77 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	3524	-0.23310	5.15791	0.08689	
DEP	4601	1.30717	6.27613	0.09253	
INR	587	0.35759	6.73425	0.27795	
OVR	6069	-0.09036	4.39379	0.05640	
Means Comparisons					
Dif=Mean[i]-Mean[j]		DEP	INR	OVR	ARR
DEP		0.00000	0.94957	1.39753	1.54027
INR		-0.94957	0.00000	0.44795	0.59069
OVR		-1.39753	-0.44795	0.00000	0.14274
ARR		-1.54027	-0.59069	-0.14274	0.00000
Alpha=	0.05	Comparisons for all pairs using Tukey-Kramer HSD			
		q*=2.56932			
Abs(Dif)-LSD		DEP	INR	OVR	ARR
DEP		-0.28512	0.35020	1.13020	1.23413
INR		0.35020	-0.79825	-0.14317	-0.01896
OVR		1.13020	-0.14317	-0.24826	-0.14689
ARR		1.23413	-0.01896	-0.14689	-0.32579

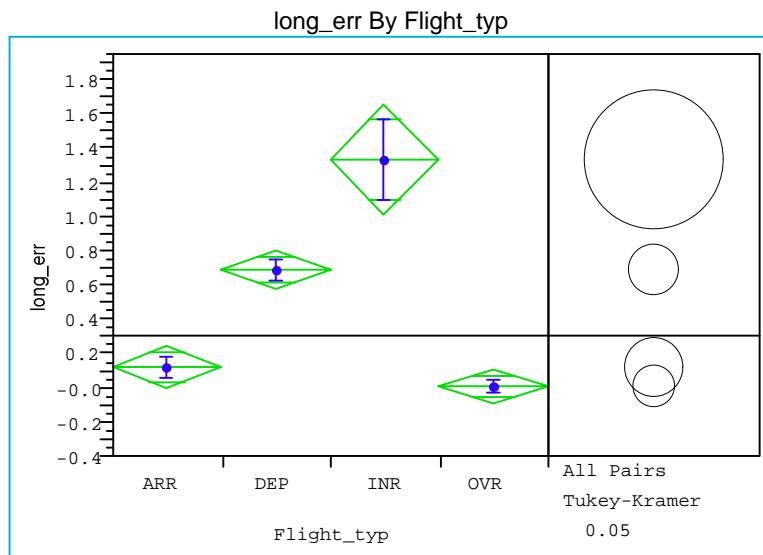
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ARR	3524	5.157907	3.064321	3.050366	
DEP	4601	6.276126	3.837585	3.498012	
INR	587	6.734253	3.831845	3.796311	
OVR	6069	4.393789	1.846023	1.841193	

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	39.4011	3	14777	<.0001
Brown-Forsythe	136.6233	3	14777	<.0001
Levene	193.4383	3	14777	<.0001
Bartlett	252.3342	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	64.7453	3	2536.2	<.0001

Figure A.2- 78 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	3524	0.13325	4.05382	0.06829
DEP	4601	0.71609	4.65847	0.06868
INR	587	1.33758	5.86761	0.24218
OVR	6069	0.02175	3.46395	0.04446

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.00000	0.62149	1.20433	1.31583
DEP	-0.62149	0.00000	0.58284	0.69434
ARR	-1.20433	-0.58284	0.00000	0.11150
OVR	-1.31583	-0.69434	-0.11150	0.00000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56932

Abs(Dif)-LSD	INR	DEP	ARR	OVR
INR	-0.61774	0.157654	0.732544	0.858385
DEP	0.157654	-0.22065	0.345935	0.487465
ARR	0.732544	0.345935	-0.25212	-0.11264
OVR	0.858385	0.487465	-0.11264	-0.19212

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

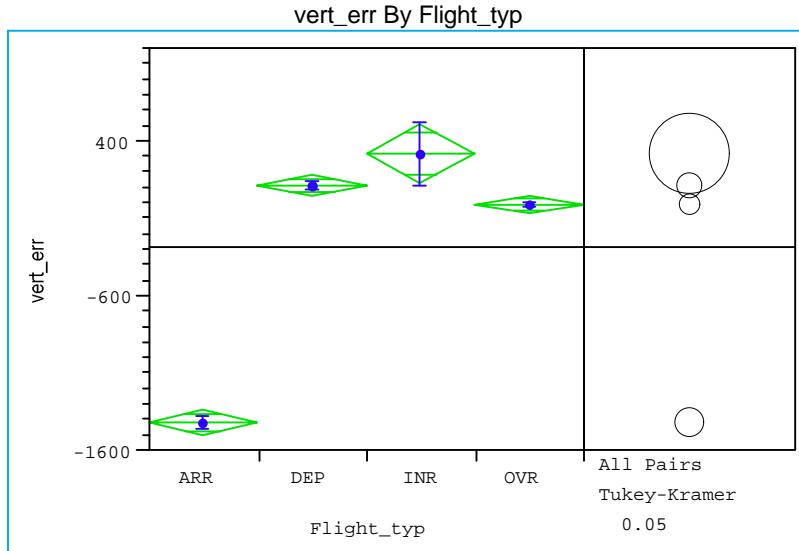
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3524	4.053821	2.466797	2.465175
DEP	4601	4.658474	3.302148	3.269237
INR	587	5.867611	3.990781	3.931556
OVR	6069	3.463951	2.016506	2.015870

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	33.1286	3	14777	<.0001
Brown-Forsythe	174.4498	3	14777	<.0001
Levene	187.8547	3	14777	<.0001
Bartlett	222.3397	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
31.6284	3	2521.5	<.0001

Figure A.2- 79 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	3524	-1413.52	3060.83	51.56	
DEP	4601	125.61	2690.82	39.67	
INR	587	322.53	5126.08	211.58	
OVR	6069	-1.04	1404.76	18.03	

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00	196.93	323.57	1736.06
DEP	-196.93	0.00	126.64	1539.13
OVR	-323.57	-126.64	0.00	1412.48
ARR	-1736.06	-1539.13	-1412.48	0.00

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56932

Abs(Dif)-LSD	INR	DEP	OVR	ARR
INR	-377.62	-86.61	43.94	1447.66
DEP	-86.61	-134.88	0.18	1394.31
OVR	43.94	0.18	-117.44	1275.47
ARR	1447.66	1394.31	1275.47	-154.12

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

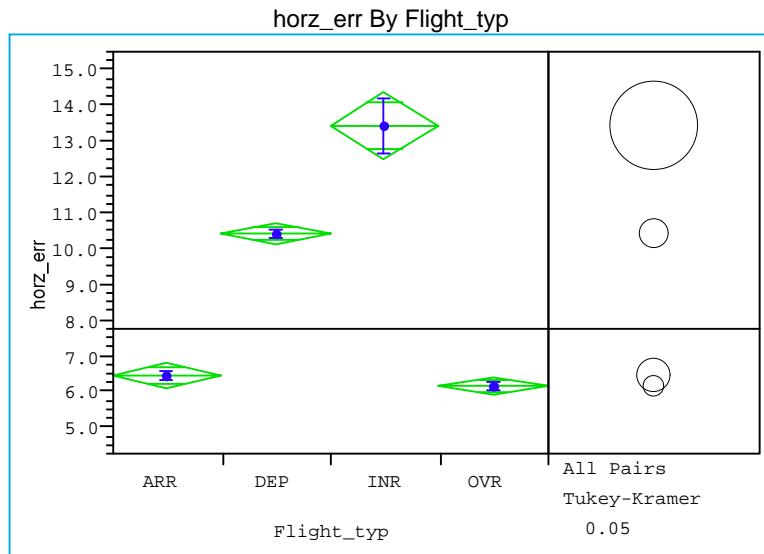
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	3524	3060.829	2252.792	1981.425
DEP	4601	2690.818	1465.116	1409.533
INR	587	5126.078	2868.165	2698.065
OVR	6069	1404.760	392.628	391.851

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	201.6230	3	14777	<.0001
Brown-Forsythe	517.0105	3	14777	0.0000
Levene	798.2990	3	14777	0.0000
Bartlett	1420.3592	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
238.2345	3	2394.6	<.0001

Figure A.2- 80 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	1595	6.4839	6.4759	0.16215
DEP	2511	10.4451	8.2364	0.16437
INR	262	13.4387	13.1882	0.81477
OVR	3806	6.2038	8.2718	0.13408

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	ARR	OVR
INR	0.00000	2.99359	6.95483	7.23489
DEP	-2.99359	0.00000	3.96124	4.24130
ARR	-6.95483	-3.96124	0.00000	0.28006
OVR	-7.23489	-4.24130	-0.28006	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56956	
Abs(Dif)-LSD	
INR	-1.83002
DEP	1.63373
ARR	5.55857
OVR	5.89707
INR	1.63373
DEP	-0.59113
ARR	3.29058
OVR	3.70279
INR	5.55857
DEP	-0.74170
ARR	-0.34471
OVR	-0.48015

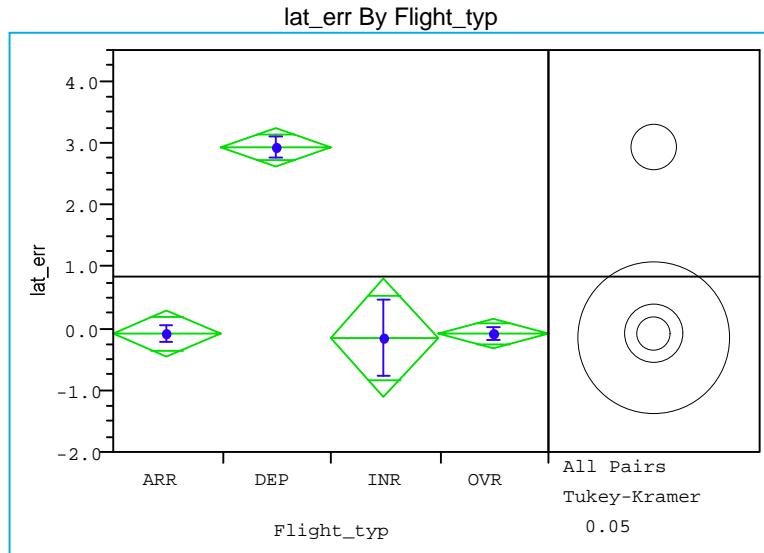
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1595	6.47587	4.409969	4.096753
DEP	2511	8.23636	6.431127	6.254751
INR	262	13.18822	9.319455	8.557274
OVR	3806	8.27178	5.267627	4.581328

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	24.6861	3	8170	<.0001
Brown-Forsythe	66.9528	3	8170	<.0001
Levene	78.2751	3	8170	<.0001
Bartlett	106.2329	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	168.6419	3	1147.4	<.0001

Figure A.2- 81 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	1595	-0.05141	5.9488	0.14895
DEP	2511	2.94013	9.5544	0.19067
INR	262	-0.14939	10.0511	0.62096
OVR	3806	-0.05280	7.7632	0.12584

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	ARR	OVR	INR
DEP	0.00000	2.99153	2.99293	3.08951
ARR	-2.99153	0.00000	0.00139	0.09798
OVR	-2.99293	-0.00139	0.00000	0.09659
INR	-3.08951	-0.09798	-0.09659	0.00000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.56956

Abs(Dif)-LSD	DEP	ARR	OVR	INR
DEP	-0.59024	2.32189	2.45524	1.73171
ARR	2.32189	-0.74058	-0.62242	-1.29617
OVR	2.45524	-0.62242	-0.47942	-1.23921
INR	1.73171	-1.29617	-1.23921	-1.82726

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

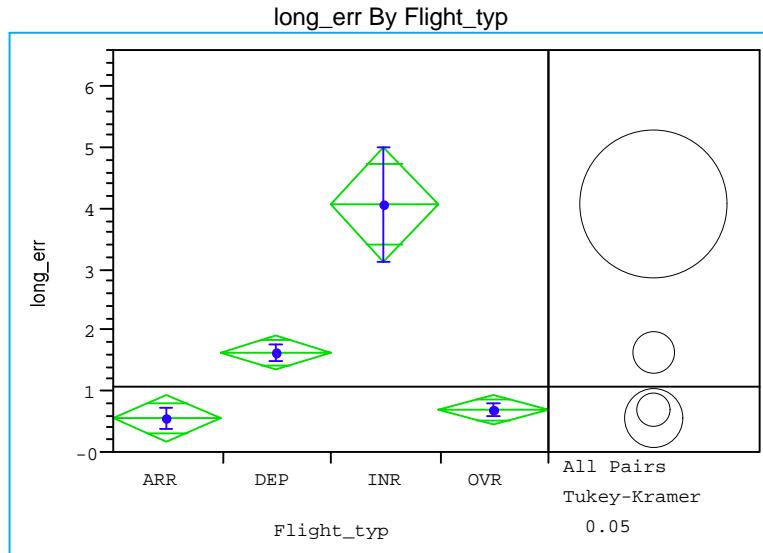
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1595	5.94877	3.592642	3.591725
DEP	2511	9.55439	6.622102	6.128857
INR	262	10.05110	5.673617	5.655618
OVR	3806	7.76318	3.226425	3.226131

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	19.3541	3	8170	<.0001
Brown-Forsythe	96.5331	3	8170	<.0001
Levene	143.5206	3	8170	<.0001
Bartlett	148.0216	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
65.8062	3	1160.8	<.0001

Figure A.2- 82 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	1595	0.19382	6.9697	0.17451
DEP	2511	1.30713	8.6798	0.17322
INR	262	3.71569	15.5021	0.95772
OVR	3806	0.32461	6.8224	0.11059

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00000	2.40856	3.39107	3.52186
DEP	-2.40856	0.00000	0.98251	1.11331
OVR	-3.39107	-0.98251	0.00000	0.13079
ARR	-3.52186	-1.11331	-0.13079	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56956	
Abs(Dif)-LSD	INR
INR	-1.76742
DEP	1.09522
OVR	2.09901
ARR	2.17336
Abs(Dif)-LSD	DEP
INR	1.09522
DEP	-0.57091
OVR	0.46243
ARR	0.46560
Abs(Dif)-LSD	OVR
INR	2.09901
DEP	-0.46372
OVR	-0.47260
ARR	-0.47260
Abs(Dif)-LSD	ARR
INR	2.17336
DEP	0.46560
OVR	-0.47260
ARR	-0.71633

Positive values show pairs of means that are significantly different.

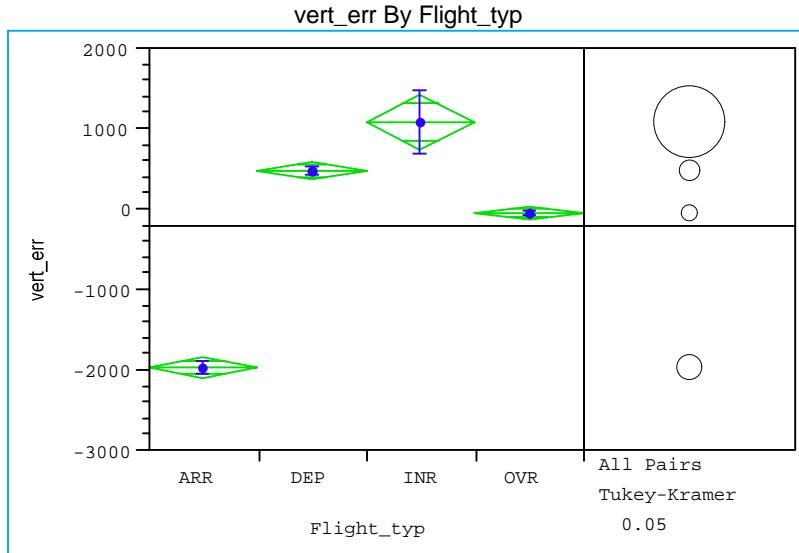
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1595	6.96966	4.38399	4.38362
DEP	2511	8.67979	6.52416	6.47047
INR	262	15.50208	10.61387	10.47426
OVR	3806	6.82238	4.00888	4.00871

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	78.5880	3	8170	<.0001
Brown-Forsythe	168.9026	3	8170	<.0001
Levene	180.1406	3	8170	<.0001
Bartlett	211.2908	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
12.7640	3	1123.5	<.0001

Figure A.2- 83 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	1595	-1946.08	3537.60	88.58	
DEP	2511	507.25	3196.61	63.79	
INR	262	1082.46	6391.57	394.87	
OVR	3806	-26.60	1904.24	30.87	

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00	575.21	1109.06	3028.54
DEP	-575.21	0.00	533.85	2453.33
OVR	-1109.06	-533.85	0.00	1919.48
ARR	-3028.54	-2453.33	-1919.48	0.00

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.56956	
Abs(Dif)-LSD	
INR	INR
DEP	86.70
OVR	628.47
ARR	2526.96
	DEP
	OVR
	ARR

Positive values show pairs of means that are significantly different.

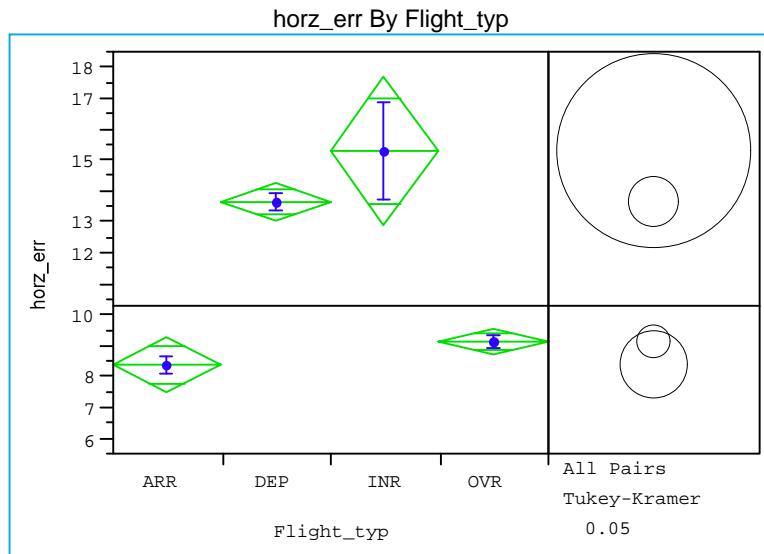
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	1595	3537.600	2717.032	2587.946
DEP	2511	3196.614	1763.663	1481.987
INR	262	6391.569	3902.425	3343.819
OVR	3806	1904.245	608.155	588.348

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	105.9061	3	8170	<.0001
Brown-Forsythe	291.0796	3	8170	<.0001
Levene	427.3650	3	8170	<.0001
Bartlett	607.8525	3	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
179.6429	3	1084.8	<.0001

Figure A.2- 84 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	568	8.3616	7.4698	0.3134
DEP	1051	13.6115	10.0271	0.3093
INR	76	15.3086	14.1192	1.6196
OVR	2217	9.1400	11.8309	0.2513

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00000	1.69707	6.16858	6.94694
DEP	-1.69707	0.00000	4.47151	5.24987
OVR	-6.16858	-4.47151	0.00000	0.77836
ARR	-6.94694	-5.24987	-0.77836	0.00000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

$q^*=2.57014$

Abs(Dif)-LSD	INR	DEP	OVR	ARR
INR	-4.53485	-1.62347	2.90746	3.53252
DEP	-1.62347	-1.21946	3.42460	3.79407
OVR	2.90746	3.42460	-0.83963	-0.53629
ARR	3.53252	3.79407	-0.53629	-1.65881

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

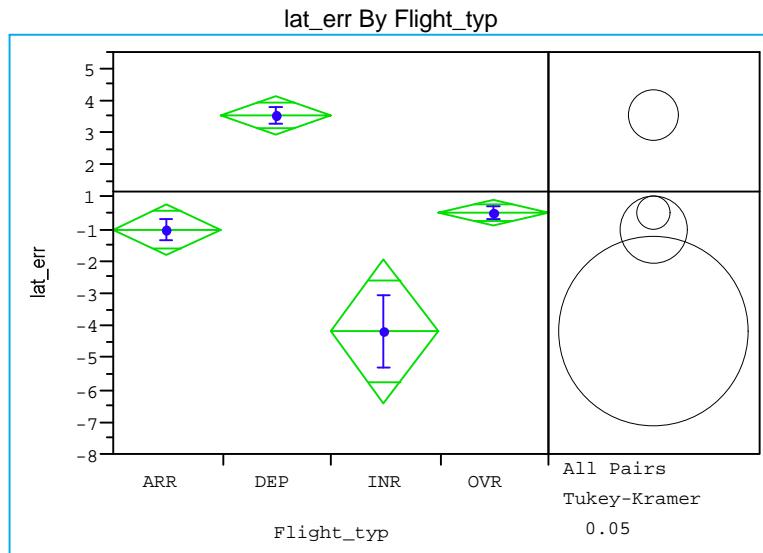
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	568	7.46975	5.39484	5.07133
DEP	1051	10.02706	7.94571	7.84246
INR	76	14.11919	10.93628	10.26502
OVR	2217	11.83086	7.65672	6.71364

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	9.2485	3	3908	<.0001
Brown-Forsythe	15.2901	3	3908	<.0001
Levene	19.9114	3	3908	<.0001
Bartlett	61.5966	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
60.9921	3	342.04	<.0001

Figure A.2- 85 Statistical Tests for Horizontal Error and Flight Type at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	568	-0.49947	8.2107	0.3445
DEP	1051	3.07868	10.4293	0.3217
INR	76	-3.63685	9.8520	1.1301
OVR	2217	0.04260	10.5933	0.2250

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	ARR	INR
DEP	0.00000	3.03608	3.57815	6.71553
OVR	-3.03608	0.00000	0.54207	3.67945
ARR	-3.57815	-0.54207	0.00000	3.13738
INR	-6.71553	-3.67945	-3.13738	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
q*=2.57014	
Abs(Dif)-LSD	
DEP	-1.14612
OVR	2.05213
ARR	2.20991
INR	3.59470
DEP	2.05213
OVR	-0.78913
ARR	-0.69351
INR	0.61446
DEP	2.20991
OVR	-0.69351
ARR	-1.55904
INR	-0.07168
OVR	3.59470
ARR	-4.26211
INR	

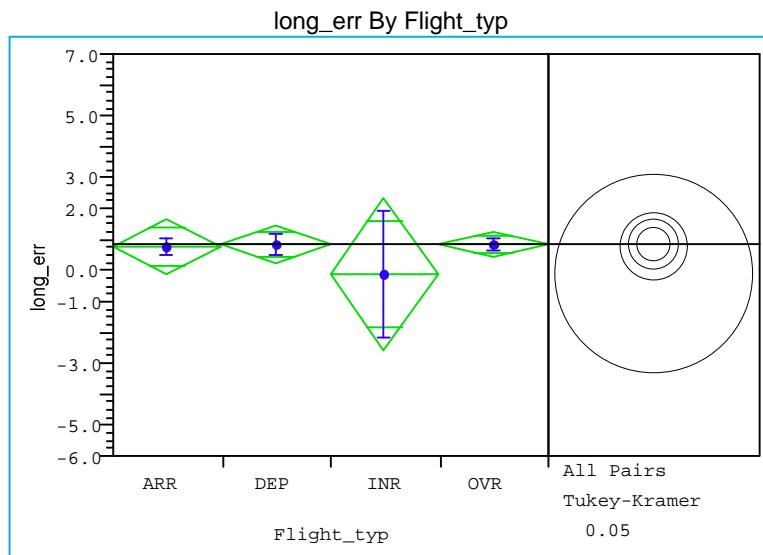
Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	568	8.21067	4.950546	4.861906
DEP	1051	10.42935	7.087868	6.798501
INR	76	9.85200	6.609563	6.060208
OVR	2217	10.59330	4.557133	4.547427

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.6793	3	3908	0.1692
Brown-Forsythe	16.0530	3	3908	<.0001
Levene	21.2937	3	3908	<.0001
Bartlett	18.0091	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	29.7981	3	344.36	<.0001

Figure A.2- 86 Statistical Tests for Lateral Error and Flight Type at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ARR	568	0.831732	7.5815	0.3181
DEP	1051	0.879796	12.9212	0.3986
INR	76	-0.085566	18.0653	2.0722
OVR	2217	0.862583	10.5158	0.2233

Means Comparisons				
Dif=Mean[i]-Mean[j]	DEP	OVR	ARR	INR
DEP	0.000000	0.017213	0.048064	0.965453
OVR	-0.01721	0.000000	0.030851	0.948240
ARR	-0.04806	-0.03085	0.000000	0.917389
INR	-0.96545	-0.94824	-0.91739	0.000000

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.57014

Abs(Dif)-LSD	DEP	OVR	ARR	INR
DEP	-1.23921	-1.04666	-1.43131	-2.40886
OVR	-1.04666	-0.85322	-1.30509	-2.36569
ARR	-1.43131	-1.30509	-1.68567	-2.55232
INR	-2.40886	-2.36569	-2.55232	-4.60828

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

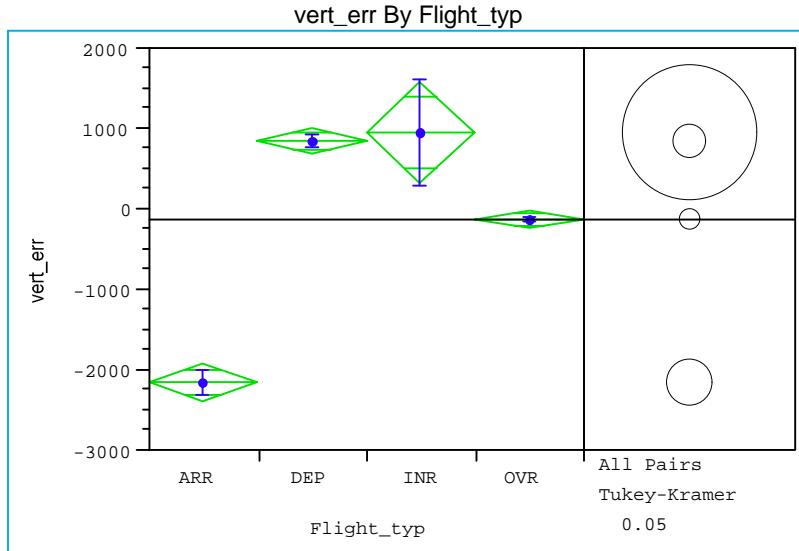
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	568	7.58151	5.39605	5.39570
DEP	1051	12.92122	9.68734	9.52229
INR	76	18.06533	12.12689	11.87389
OVR	2217	10.51581	6.09995	6.08753

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	21.4623	3	3908	<.0001
Brown-Forsythe	55.4863	3	3908	<.0001
Levene	62.1825	3	3908	<.0001
Bartlett	82.0415	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.0717	3	336.84	0.9751

Figure A.2- 87 Statistical Tests for Longitudinal Error and Flight Type at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ARR	568	-2134.48	4030.35	169.11	
DEP	1051	854.48	3332.79	102.80	
INR	76	954.04	5918.06	678.85	
OVR	2217	-118.67	2096.60	44.53	

Means Comparisons				
Dif=Mean[i]-Mean[j]	INR	DEP	OVR	ARR
INR	0.00	99.56	1072.71	3088.51
DEP	-99.56	0.00	973.15	2988.95
OVR	-1072.71	-973.15	0.00	2015.80
ARR	-3088.51	-2988.95	-2015.80	0.00

Alpha= 0.05

Comparisons for all pairs using Tukey-Kramer HSD

q*=2.57014

Abs(Dif)-LSD	INR	DEP	OVR	ARR
INR	-1215.97	-790.81	198.27	2172.97
DEP	-790.81	-326.99	692.43	2598.60
OVR	198.27	692.43	-225.14	1663.30
ARR	2172.97	2598.60	1663.30	-444.79

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ARR	568	4030.345	3168.840	3059.420
DEP	1051	3332.793	2010.625	1601.063
INR	76	5918.064	4046.664	3628.069
OVR	2217	2096.601	813.231	724.523

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	43.6092	3	3908	<.0001
Brown-Forsythe	157.1113	3	3908	<.0001
Levene	214.4960	3	3908	<.0001
Bartlett	236.1195	3	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
77.4440	3	322.02	<.0001

Figure A.2- 88 Statistical Tests for Vertical Error and Flight Type at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.2.3 Horizontal Phase of Flight Per Look Ahead Time

A.2.3.1 Summary Tables

Look Ahead Time	0		300	
	Straight	Turn	Straight	Turn
Horizontal Phase of Flight	27295	5314	22892	4271
Sample Quantity	27295	5314	22892	4271
Avg. Horz. Error	0.26	0.33	2.59	2.88
Stddev. Horz. Error	0.83	0.92	3.18	3.28
Max. Horz. Error	48.02	25.79	88.45	32.87
Min. Horz. Error	0	0	0	0.01
Avg. Lat. Error	0	0	0.05	-0.12
Stddev. Lat. Error	0.46	0.44	3.29	3.36
Max. Lat. Error	22.88	11.48	46.61	20.75
Min. Lat. Error	-15.57	-8.26	-46.12	-30.48
Avg. Abs. Lat. Error	0.12	0.17	1.71	1.83
Stddev. Abs. Lat. Error	0.44	0.4	2.81	2.82
Max. Abs. Lat. Error	22.88	11.48	46.61	30.48
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.04	-0.11	-0.03	-0.23
Stddev. Long. Error	0.74	0.87	2.44	2.77
Max. Long. Error	47.54	17.84	46.01	22.74
Min. Long. Error	-31.16	-23.09	-87.99	-26.03
Avg. Abs. Long. Error	0.2	0.24	1.44	1.72
Stddev. Abs. Long. Error	0.72	0.85	1.98	2.19
Max. Abs. Long. Error	47.54	23.09	87.99	26.03
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-92.51	-131.26	-487.15	-746.29
Stddev. Vert. Error	767.14	894.17	2132.89	2287.29
Max. Vert. Error	18889	5200	27290	16460.38
Min. Vert. Error	-31025	-31466.5	-24677	-17950
Avg. Abs. Vert. Error	149	179.68	1021.07	1278.96
Stddev. Abs. Vert. Error	758.19	885.71	1934.92	2037.81
Max. Abs. Vert. Error	31025	31466.46	27290	17950
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	0.27	0.34	2.62	2.91
Stddev. Slant Range Error	0.84	0.93	3.18	3.27
Max. Slant Range Error	48.03	25.79	88.56	32.89
Min. Slant Range Error	0	0	0.01	0.01

Figure A.2- 89 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	600		900	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	18406	3502	14224	2717
Avg. Horz. Error	4.42	5.1	6.1	6.78
Stddev. Horz. Error	4.85	5.44	6.38	7.41
Max. Horz. Error	67.08	65.69	85.13	101.09
Min. Horz. Error	0.01	0.02	0.01	0.05
Avg. Lat. Error	0.27	0.05	0.5	0.25
Stddev. Lat. Error	4.94	5.5	6.24	6.78
Max. Lat. Error	55.5	38.94	60.84	54.78
Min. Lat. Error	-38.27	-34.2	-43.96	-64.27
Avg. Abs. Lat. Error	2.6	2.97	3.28	3.62
Stddev. Abs. Lat. Error	4.21	4.63	5.34	5.73
Max. Abs. Lat. Error	55.5	38.94	60.84	64.27
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.35	0.01	0.7	0.34
Stddev. Long. Error	4.3	5.04	6.18	7.4
Max. Long. Error	59.63	25.83	49.55	58.31
Min. Long. Error	-59.4	-59.56	-76.98	-83.04
Avg. Abs. Long. Error	2.75	3.25	4.05	4.6
Stddev. Abs. Long. Error	3.32	3.85	4.72	5.8
Max. Abs. Long. Error	59.63	59.56	76.98	83.04
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-684.1	-1157.81	-793.99	-1535.62
Stddev. Vert. Error	2795.7	3059.21	3330.87	3437.51
Max. Vert. Error	28990	15000	29003	18825
Min. Vert. Error	-26868	-23629.6	-32426	-21566
Avg. Abs. Vert. Error	1436.1	1859.4	1701.93	2222.37
Stddev. Abs. Vert. Error	2494.28	2690.97	2971.26	3038.87
Max. Abs. Vert. Error	28990	23629.62	32426	21566
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.45	5.14	6.14	6.83
Stddev. Slant Range Error	4.84	5.42	6.37	7.39
Max. Slant Range Error	67.09	65.69	85.13	101.09
Min. Slant Range Error	0.01	0.04	0.01	0.06

Figure A.2- 90 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1200		1500	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	10850	2071	7738	1523
Avg. Horz. Error	7.78	8.03	9.37	9.56
Stddev. Horz. Error	8.05	8.45	9.8	9.53
Max. Horz. Error	82.64	103.04	94.14	66.7
Min. Horz. Error	0.01	0.08	0.03	0.09
Avg. Lat. Error	0.57	0.51	0.53	0.12
Stddev. Lat. Error	7.52	7.14	8.67	7.88
Max. Lat. Error	76.1	51.81	85.67	58.08
Min. Lat. Error	-55.56	-46.57	-65.63	-58.18
Avg. Abs. Lat. Error	3.92	3.87	4.46	4.17
Stddev. Abs. Lat. Error	6.44	6.01	7.46	6.68
Max. Abs. Lat. Error	76.1	51.81	85.67	58.18
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	1.21	1.11	1.75	2.38
Stddev. Long. Error	8.19	9.14	10.26	10.7
Max. Long. Error	77.59	53.21	94.14	52.7
Min. Long. Error	-74.98	-94.35	-73.71	-64.82
Avg. Abs. Long. Error	5.4	5.78	6.7	7.25
Stddev. Abs. Long. Error	6.28	7.16	7.96	8.22
Max. Abs. Long. Error	77.59	94.35	94.14	64.82
Min. Abs. Long. Error	0	0	0	0.01
Avg. Vert. Error	-933.03	-1681.97	-1012.68	-1853.79
Stddev. Vert. Error	3506.8	3884.51	3697.58	3615.68
Max. Vert. Error	29003	28590	29003	12988
Min. Vert. Error	-28868	-26558	-27901	-21608.7
Avg. Abs. Vert. Error	1837.68	2481.46	1941.86	2467.18
Stddev. Abs. Vert. Error	3129.04	3429.17	3305.51	3228.16
Max. Abs. Vert. Error	29003	28590	29003	21608.72
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	7.82	8.08	9.41	9.6
Stddev. Slant Range Error	8.04	8.43	9.79	9.51
Max. Slant Range Error	82.64	103.05	94.14	66.71
Min. Slant Range Error	0.01	0.08	0.03	0.09

Figure A.2- 91 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1800			
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	5538	1119		
Avg. Horz. Error	10.92	11.04		
Stddev. Horz. Error	11.25	11.07		
Max. Horz. Error	98.82	80.1		
Min. Horz. Error	0.03	0.14		
Avg. Lat. Error	0.4	0.72		
Stddev. Lat. Error	9.5	8.82		
Max. Lat. Error	86.54	80.05		
Min. Lat. Error	-62.21	-51.12		
Avg. Abs. Lat. Error	4.92	4.63		
Stddev. Abs. Lat. Error	8.14	7.54		
Max. Abs. Lat. Error	86.54	80.05		
Min. Abs. Lat. Error	0	0		
Avg. Long. Error	2.23	3.41		
Stddev. Long. Error	12.26	12.43		
Max. Long. Error	96.86	62.4		
Min. Long. Error	-78.6	-64.47		
Avg. Abs. Long. Error	8.06	8.45		
Stddev. Abs. Long. Error	9.5	9.74		
Max. Abs. Long. Error	96.86	64.47		
Min. Abs. Long. Error	0	0.01		
Avg. Vert. Error	-1147.78	-1854.55		
Stddev. Vert. Error	3829.33	4008.78		
Max. Vert. Error	29003	16996		
Min. Vert. Error	-29635	-25934		
Avg. Abs. Vert. Error	2075.72	2597.2		
Stddev. Abs. Vert. Error	3416.44	3572.29		
Max. Abs. Vert. Error	29635	25934		
Min. Abs. Vert. Error	0	0		
Avg. Slant Range Error	10.95	11.08		
Stddev. Slant Range Error	11.23	11.05		
Max. Slant Range Error	98.82	80.1		
Min. Slant Range Error	0.03	0.14		

Figure A.2- 92 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	0		300	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	18689	2520	16359	2092
Avg. Horz. Error	0.23	0.36	2.46	2.87
Stddev. Horz. Error	0.71	1.01	3.29	3.46
Max. Horz. Error	48.02	25.79	88.45	32.87
Min. Horz. Error	0	0	0	0.01
Avg. Lat. Error	0	0	0.08	-0.13
Stddev. Lat. Error	0.4	0.46	3.41	3.78
Max. Lat. Error	22.88	11.48	46.61	20.75
Min. Lat. Error	-15.57	-8.26	-46.12	-30.48
Avg. Abs. Lat. Error	0.1	0.19	1.68	1.97
Stddev. Abs. Lat. Error	0.39	0.43	2.98	3.22
Max. Abs. Lat. Error	22.88	11.48	46.61	30.48
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	-0.03	-0.12	0.06	-0.05
Stddev. Long. Error	0.63	0.95	2.28	2.43
Max. Long. Error	47.54	17.84	46.01	10.03
Min. Long. Error	-31.16	-23.09	-87.99	-16.55
Avg. Abs. Long. Error	0.18	0.26	1.29	1.55
Stddev. Abs. Long. Error	0.6	0.93	1.88	1.87
Max. Abs. Long. Error	47.54	23.09	87.99	16.55
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-13.84	-44.2	-115.47	-361.89
Stddev. Vert. Error	485.48	593.33	1728.77	2112.63
Max. Vert. Error	18889	5200	27290	14600
Min. Vert. Error	-21500	-16406.8	-18228	-17950
Avg. Abs. Vert. Error	69.58	93.34	698.19	1021.31
Stddev. Abs. Vert. Error	480.67	587.61	1585.71	1884.32
Max. Abs. Vert. Error	21500	16406.83	27290	17950
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	0.24	0.36	2.48	2.89
Stddev. Slant Range Error	0.72	1.01	3.29	3.45
Max. Slant Range Error	48.03	25.79	88.56	32.89
Min. Slant Range Error	0	0	0.01	0.01

Figure A.2- 93 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	600		900	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	13146	1661	10001	1216
Avg. Horz. Error	4.29	5.34	6.04	6.84
Stddev. Horz. Error	5.04	5.91	6.62	7.81
Max. Horz. Error	67.08	43.12	75.25	58.36
Min. Horz. Error	0.01	0.02	0.01	0.09
Avg. Lat. Error	0.36	0.07	0.71	0.31
Stddev. Lat. Error	5.21	6.43	6.75	8.08
Max. Lat. Error	55.5	38.94	60.84	54.78
Min. Lat. Error	-38.27	-34.2	-43.96	-38.45
Avg. Abs. Lat. Error	2.63	3.46	3.45	4.26
Stddev. Abs. Lat. Error	4.51	5.42	5.84	6.88
Max. Abs. Lat. Error	55.5	38.94	60.84	54.78
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.34	0.1	0.49	-0.06
Stddev. Long. Error	4.06	4.71	5.84	6.51
Max. Long. Error	59.63	23.35	49.55	58.31
Min. Long. Error	-29.72	-22.22	-61.99	-29.54
Avg. Abs. Long. Error	2.54	3.07	3.76	4.07
Stddev. Abs. Long. Error	3.18	3.57	4.49	5.08
Max. Abs. Long. Error	59.63	23.35	61.99	58.31
Min. Abs. Long. Error	0	0	0	0
Avg. Vert. Error	-227.61	-738.37	-170.96	-1060.4
Stddev. Vert. Error	2513.8	3125.02	2919.33	3630.59
Max. Vert. Error	28990	15000	29003	18825
Min. Vert. Error	-16708	-16406.8	-20550	-19945.7
Avg. Abs. Vert. Error	1106.31	1740.02	1259.94	2077.59
Stddev. Abs. Vert. Error	2268.69	2698.48	2638.96	3160.17
Max. Abs. Vert. Error	28990	16406.83	29003	19945.74
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	4.32	5.38	6.07	6.9
Stddev. Slant Range Error	5.03	5.9	6.62	7.78
Max. Slant Range Error	67.09	43.12	75.4	58.36
Min. Slant Range Error	0.01	0.04	0.01	0.09

Figure A.2- 94 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

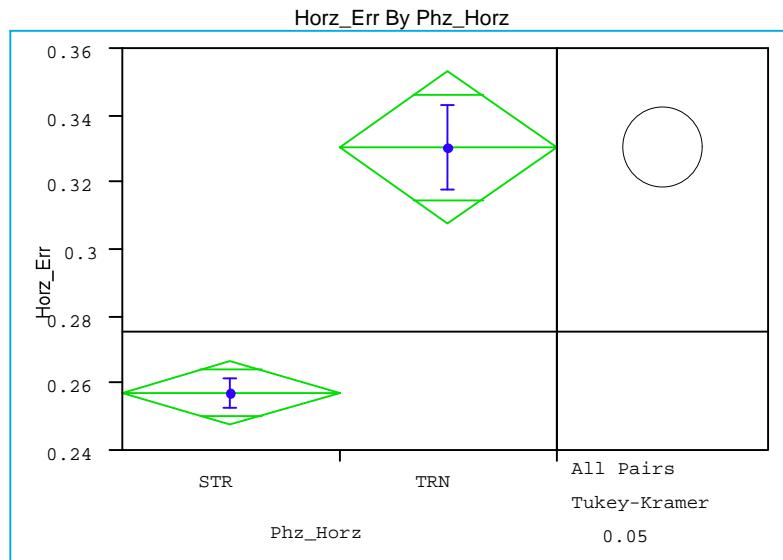
Look Ahead Time	1200		1500	
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	7290	899	5065	640
Avg. Horz. Error	7.75	8.12	9.15	8.98
Stddev. Horz. Error	8.35	9.03	9.89	9.37
Max. Horz. Error	78.4	86.73	87.22	66.7
Min. Horz. Error	0.01	0.08	0.03	0.09
Avg. Lat. Error	0.88	0.71	0.88	-0.15
Stddev. Lat. Error	8.26	8.16	9.53	9.13
Max. Lat. Error	76.1	51.81	85.67	58.08
Min. Lat. Error	-55.56	-46.57	-65.63	-58.18
Avg. Abs. Lat. Error	4.25	4.43	4.81	4.93
Stddev. Abs. Lat. Error	7.14	6.89	8.27	7.68
Max. Abs. Lat. Error	76.1	51.81	85.67	58.18
Min. Abs. Lat. Error	0	0	0	0
Avg. Long. Error	0.76	0.21	0.84	0.52
Stddev. Long. Error	7.76	8.97	9.45	9.21
Max. Long. Error	77.59	53.21	63.91	45.31
Min. Long. Error	-48.76	-85.87	-61.99	-43.79
Avg. Abs. Long. Error	5.02	5.37	6.11	5.95
Stddev. Abs. Long. Error	5.97	7.18	7.26	7.04
Max. Abs. Long. Error	77.59	85.87	63.91	45.31
Min. Abs. Long. Error	0	0.03	0	0.01
Avg. Vert. Error	-122.61	-837.67	-87.3	-920.05
Stddev. Vert. Error	2952.86	3769.17	2915.69	3442.38
Max. Vert. Error	29003	28590	29003	12988
Min. Vert. Error	-19633	-17533	-20550	-19924.8
Avg. Abs. Vert. Error	1255.15	2063.47	1248.58	1902.22
Stddev. Abs. Vert. Error	2675.6	3262.89	2636.21	3012.25
Max. Abs. Vert. Error	29003	28590	29003	19924.8
Min. Abs. Vert. Error	0	0	0	0
Avg. Slant Range Error	7.78	8.16	9.17	9.02
Stddev. Slant Range Error	8.34	9.01	9.88	9.35
Max. Slant Range Error	78.4	86.86	87.23	66.71
Min. Slant Range Error	0.01	0.08	0.03	0.09

Figure A.2- 95 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	1800			
Horizontal Phase of Flight	Straight	Turn	Straight	Turn
Sample Quantity	3471	446		
Avg. Horz. Error	10.24	11.15		
Stddev. Horz. Error	10.95	12.07		
Max. Horz. Error	87.65	80.1		
Min. Horz. Error	0.03	0.16		
Avg. Lat. Error	0.74	0.46		
Stddev. Lat. Error	10.21	11.2		
Max. Lat. Error	86.54	80.05		
Min. Lat. Error	-62.21	-51.12		
Avg. Abs. Lat. Error	5.16	5.87		
Stddev. Abs. Lat. Error	8.84	9.54		
Max. Abs. Lat. Error	86.54	80.05		
Min. Abs. Lat. Error	0	0		
Avg. Long. Error	0.74	1.57		
Stddev. Long. Error	10.93	11.92		
Max. Long. Error	77.47	52.26		
Min. Long. Error	-58.65	-36.95		
Avg. Abs. Long. Error	7	7.46		
Stddev. Abs. Long. Error	8.42	9.42		
Max. Abs. Long. Error	77.47	52.26		
Min. Abs. Long. Error	0	0.01		
Avg. Vert. Error	-65.69	-620.82		
Stddev. Vert. Error	2979.91	3577.84		
Max. Vert. Error	29003	16996		
Min. Vert. Error	-17851	-16883		
Avg. Abs. Vert. Error	1289.48	1900.28		
Stddev. Abs. Vert. Error	2687.17	3093.23		
Max. Abs. Vert. Error	29003	16996		
Min. Abs. Vert. Error	0	0		
Avg. Slant Range Error	10.26	11.18		
Stddev. Slant Range Error	10.94	12.06		
Max. Slant Range Error	87.65	80.1		
Min. Slant Range Error	0.03	0.16		

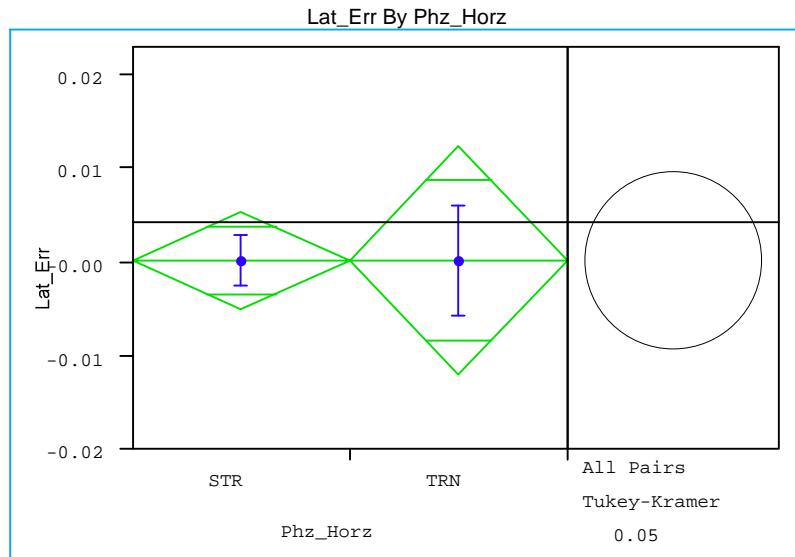
Figure A.2- 96 Descriptive Statistics for Horizontal Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

A.2.3.2 Statistical Tests



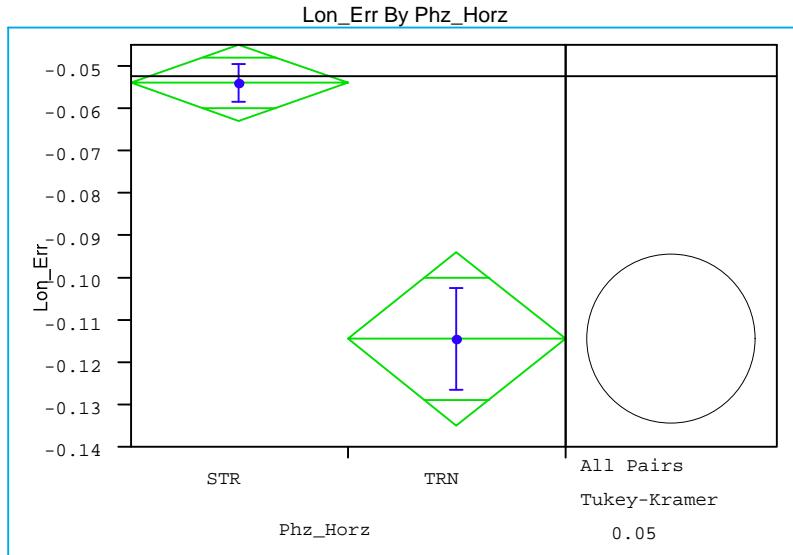
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	27264	0.264519	0.833229	0.00505
TRN	5295	0.331566	0.926179	0.01273
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.067046	
STR		-0.06705	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96004$		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.03234	0.042055	
STR		0.042055	-0.01425	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	27264	0.8332289	0.2365059	0.1939988
TRN	5295	0.9261793	0.3046642	0.2557873
Test				
O'Brien[.5]		F Ratio	DF Num	DF Den
Brown-Forsythe		0.3673	1	32557
Levene		24.2398	1	32557
Bartlett		31.2597	1	32557
		103.9422	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		23.9786	1	<.0001
		t-Test		
		4.8968		

Figure A.2- 97 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



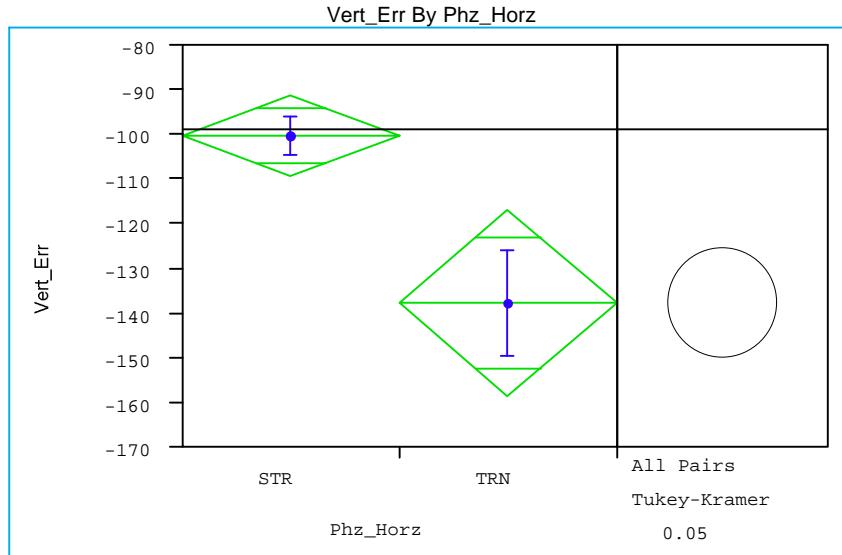
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	27264	0.000231	0.457736	0.00277	
TRN	5295	0.001114	0.436308	0.00600	
Means Comparisons					
Dif=Mean[i]-Mean[j]		TRN	STR		
TRN		0.000000	0.000884		
STR		-0.00088	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96004			
Abs(Dif)-LSD		TRN	STR		
TRN		-0.01731	-0.01249		
STR		-0.01249	-0.00763		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	27264	0.4577364		0.1178316	0.1178224
TRN	5295	0.4363083		0.1693752	0.1693221
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0695	1	32557	0.7921	
Brown-Forsythe	61.8537	1	32557	<.0001	
Levene	61.9610	1	32557	<.0001	
Bartlett	19.9428	1	?	<.0001	
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	0.0179	1	7730.6	0.8936	
t-Test					
	0.1338				

Figure A.2- 98 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



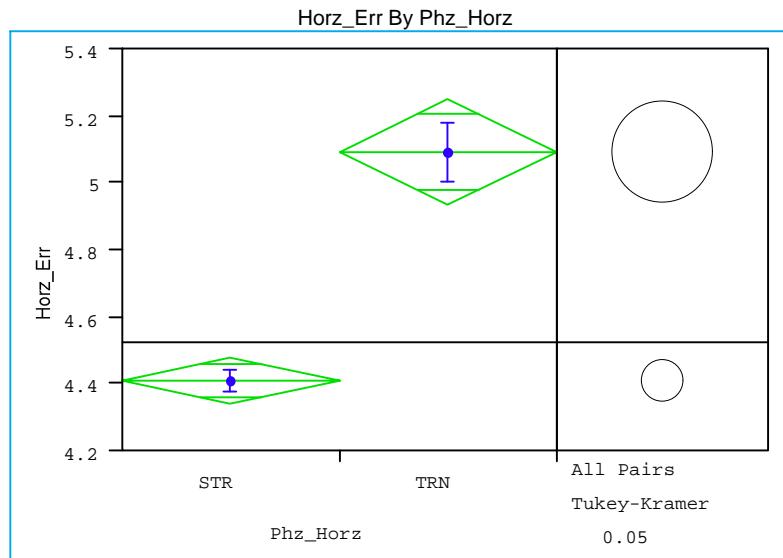
Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	27264	-0.0385	0.743800	0.00450
TRN	5295	-0.10702	0.875181	0.01203
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.068517	
TRN		-0.06852	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96004		
Abs(Dif)-LSD		STR	TRN	
STR		-0.01287	0.045949	
TRN		0.045949	-0.02921	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	27264	0.7437996	0.1995113	0.1995111
TRN	5295	0.8751809	0.2347585	0.2290639
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		0.7503	1	32557
Brown-Forsythe		7.0894	1	32557
Levene		10.0976	1	32557
Bartlett		252.0478	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		28.4616	1	<.0001
		t-Test		
		5.3349		

Figure A.2- 99 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



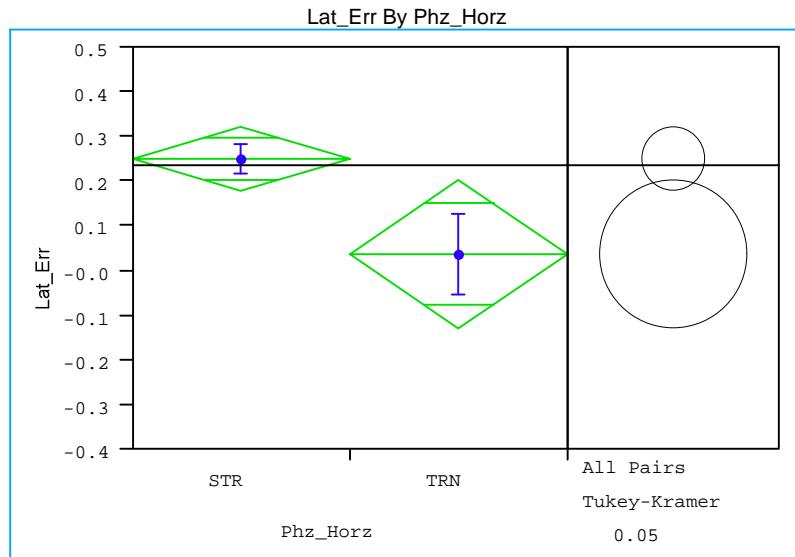
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	27264	-92.649	767.552	4.649
TRN	5295	-130.028	887.590	12.198
Means Comparisons				
Dif=Mean[i]-Mean[j]			STR	TRN
STR		0.0000	37.3792	
TRN		-37.3792	0.0000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96004		
Abs(Dif)-LSD			STR	TRN
STR		-13.2338	14.1746	
TRN		14.1746	-30.0295	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	27264	767.5522	197.5797	149.1224
TRN	5295	887.5899	241.5362	178.5519
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		1.0469	1	32557
Brown-Forsythe		6.3205	1	32557
Levene		14.7896	1	32557
Bartlett		199.6234	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		8.1999	1	0.0042
		t-Test		
		2.8635		<.0001

Figure A.2- 100 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



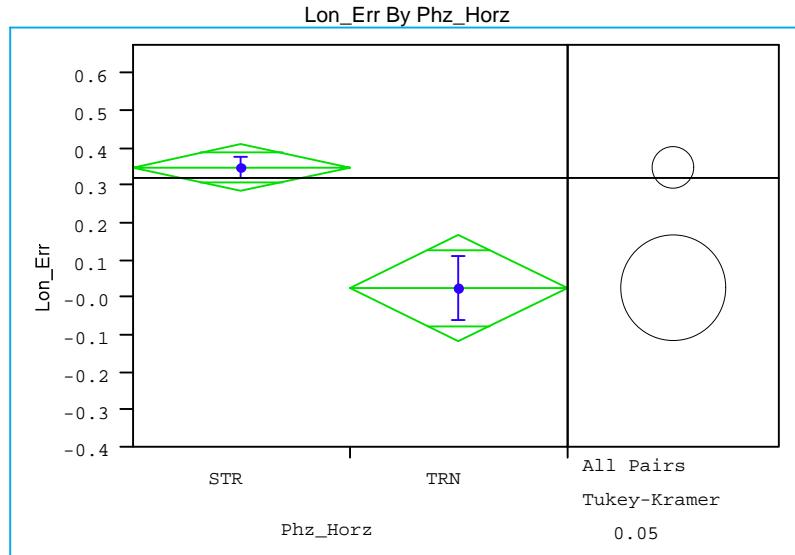
Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	18383	4.41936	4.85142	0.03578
TRN	3496	5.09933	5.43096	0.09185
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.679975	
STR		-0.67998	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96007		
Abs(Dif)-LSD	TRN	STR		
TRN	-0.232	0.501009		
STR	0.501009	-0.10117		
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	18383	4.851417	3.377828	3.094611
TRN	3496	5.430962	3.812087	3.516101
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		11.9422	1	21877
Brown-Forsythe		30.2115	1	21877
Levene		44.0381	1	21877
Bartlett		78.6677	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		47.5822	1	4616
		t-Test		
		6.8980		<.0001

Figure A.2- 101 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



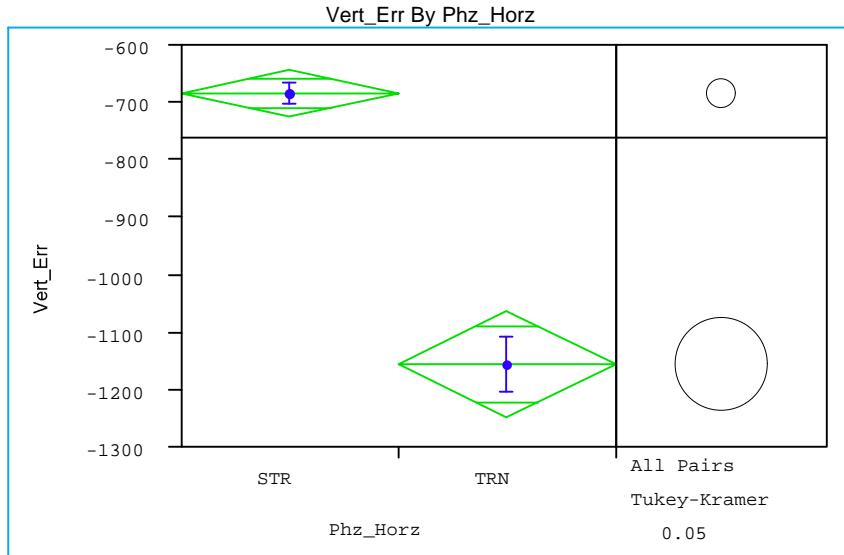
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	18383	0.271442	4.93684	0.03641	
TRN	3496	0.050082	5.50190	0.09305	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.221360		
TRN		-0.22136	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96007			
Abs(Dif)-LSD		STR	TRN		
STR		-0.10286	0.039398		
TRN		0.039398	-0.23588		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	18383	4.936844		2.643731	2.595941
TRN	3496	5.501902		2.977712	2.975884
Test			F Ratio	DF Num	DF Den
O'Brien[.5]			12.2004	1	21877
Brown-Forsythe			23.1718	1	21877
Levene			18.1775	1	21877
Bartlett			72.4041	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal					
		F Ratio	DF Num	DF Den	Prob>F
		4.9076	1	4626.6	0.0268
		t-Test			
		2.2153			

Figure A.2- 102 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



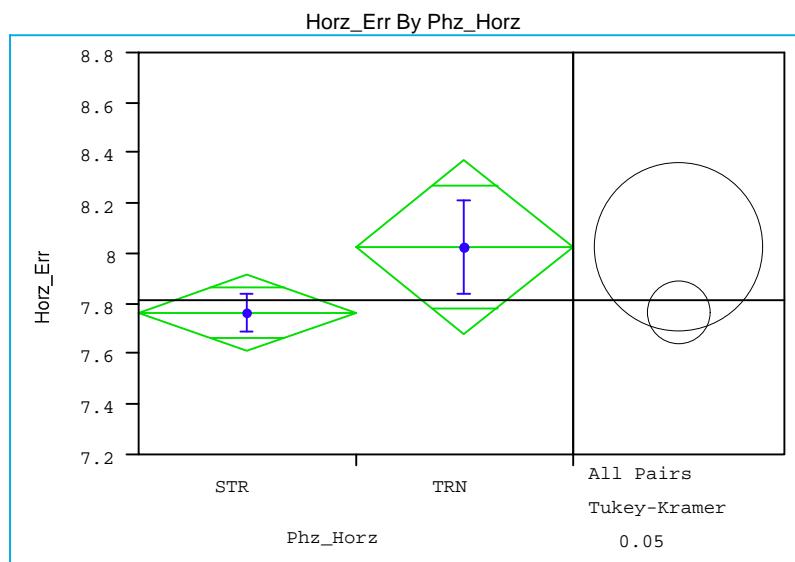
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	18383	0.349696	4.30111	0.03172	
TRN	3496	0.001907	5.02320	0.08496	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.347789		
TRN		-0.34779	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96007			
Abs(Dif)-LSD		STR	TRN		
STR		-0.09046	0.187780		
TRN		0.187780	-0.20742		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	18383	4.301115		2.744387	2.741431
TRN	3496	5.023198		3.238126	3.236695
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	24.9127	1	21877	<.0001	
Brown-Forsythe	62.1081	1	21877	<.0001	
Levene	61.8858	1	21877	<.0001	
Bartlett	151.5898	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
14.7081	1	4520.9	0.0001		
t-Test					
3.8351					

Figure A.2- 103 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



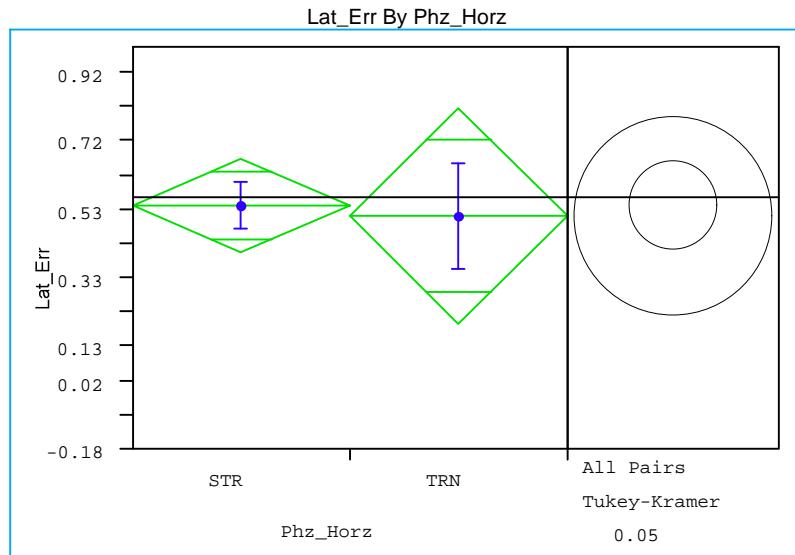
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	18383	-684.67	2796.76	20.628
TRN	3496	-1151.68	3046.70	51.528
Means Comparisons				
Dif=Mean[i]-Mean[j]			STR	TRN
STR		0.000	467.004	
TRN		-467.004	0.000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96007$		
Abs(Dif)-LSD			STR	TRN
STR		-58.025	364.360	
TRN		364.360	-133.058	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	18383	2796.759	1727.401	1437.303
TRN	3496	3046.698	2138.179	1854.463
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		8.4916	1	21877
Brown-Forsythe		80.1809	1	21877
Levene		102.8909	1	21877
Bartlett		44.7184	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		70.7946	1	4682.1
		t-Test		
		8.4140		Prob>F
				<.0001

Figure A.2- 104 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



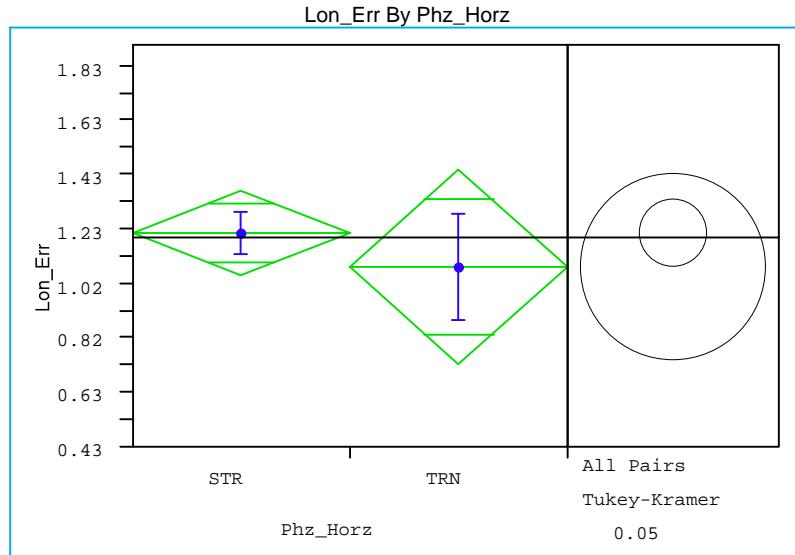
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	10835	7.78408	8.05411	0.07738
TRN	2071	8.02718	8.45143	0.18571
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.243101	
STR		-0.2431	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96015$		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.49457	-0.13857	
STR		-0.13857	-0.21622	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	10835	8.054112	5.778909	5.349948
TRN	2071	8.451432	6.002259	5.569880
Test				
O'Brien[.5]		F Ratio	DF Num	DF Den
Brown-Forsythe		1.3686	1	12904
Levene		1.8934	1	12904
Bartlett		2.7022	1	12904
		8.2351	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		1.4601	1	2834.7
		t-Test		Prob>F
		1.2083		0.2270

Figure A.2- 105 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



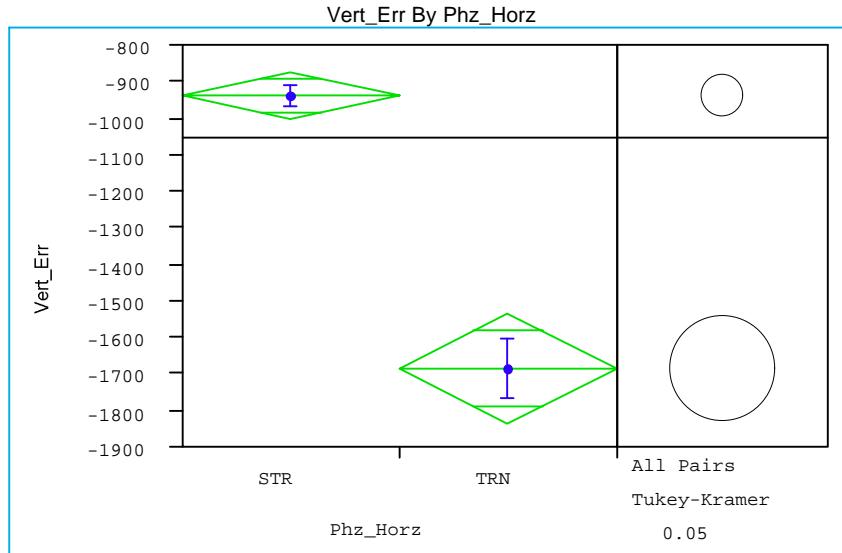
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	10835	0.571675	7.52091	0.07225	
TRN	2071	0.511069	7.13722	0.15683	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.060605		
TRN		-0.06061	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96015			
Abs(Dif)-LSD		STR	TRN		
STR		-0.19869	-0.29011		
TRN		-0.29011	-0.45446		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	10835	7.520910		4.054863	3.925750
TRN	2071	7.137216		3.953829	3.874962
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.2475	1	12904	0.2641	
Brown-Forsythe	0.1104	1	12904	0.7397	
Levene	0.4511	1	12904	0.5018	
Bartlett	9.3052	1	?	0.0023	
F Ratio	DF Num	DF Den	Prob>F		
0.1232	1	3016	0.7256		
t-Test					
0.3510					

Figure A.2- 106 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



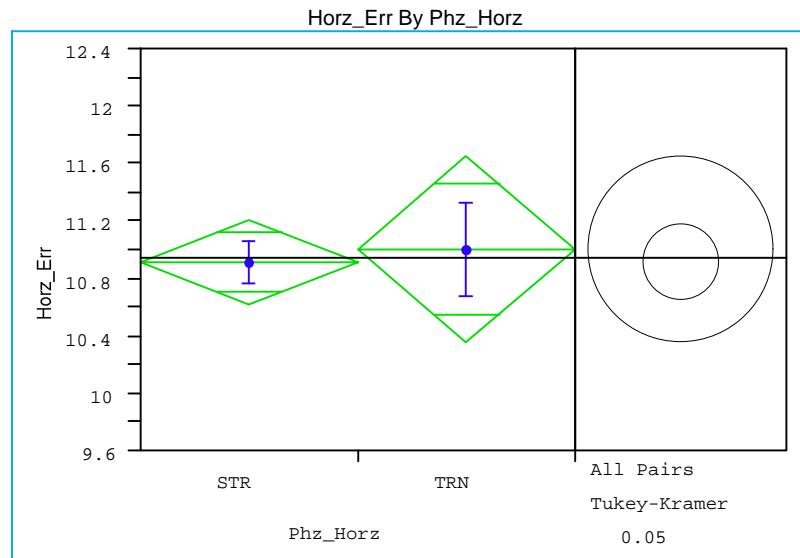
Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	10835	1.21619	8.19122	0.07869
TRN	2071	1.10775	9.13590	0.20075
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.108443	
TRN		-0.10844	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96015		
Abs(Dif)-LSD		STR	TRN	
STR		-0.22237	-0.28408	
TRN		-0.28408	-0.50863	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	10835	8.191218	5.376988	5.352639
TRN	2071	9.135898	5.759456	5.745554
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		8.8611	1	12904
Brown-Forsythe		6.6045	1	12904
Levene		6.3391	1	12904
Bartlett		43.4774	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	Prob>F
		0.2529	1	0.6151
		t-Test		
		0.5029		<.0001

Figure A.2- 107 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



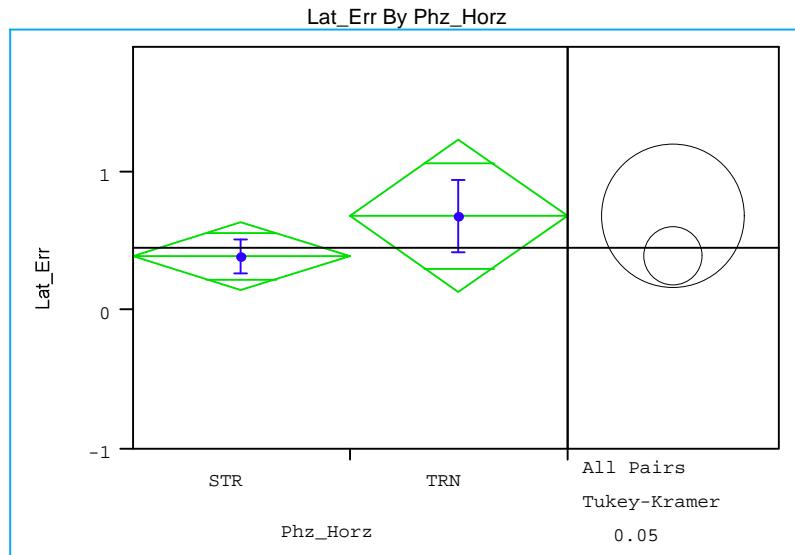
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	10835	-934.42	3509.02	33.711
TRN	2071	-1681.97	3884.51	85.358
Means Comparisons				
Dif=Mean[i]-Mean[j]			STR	TRN
STR		0.000	747.554	
TRN		-747.554	0.000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96015		
Abs(Dif)-LSD			STR	TRN
STR		-95.124	579.642	
TRN		579.642	-217.578	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	10835	3509.019	2212.443	1840.122
TRN	2071	3884.508	2788.978	2480.770
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	7.6384	1	12904	0.0057
Brown-Forsythe	70.6209	1	12904	<.0001
Levene	78.0962	1	12904	<.0001
Bartlett	37.5909	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	66.3506	1	2753.3	<.0001
t-Test				
	8.1456			

Figure A.2- 108 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



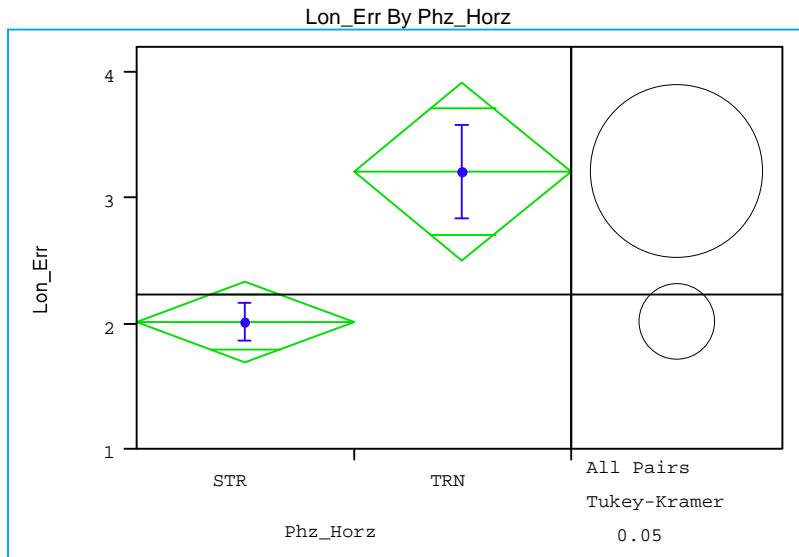
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5533	10.9251	11.2512	0.15126
TRN	1119	11.0378	11.0722	0.33099
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.112691	
STR		-0.11269	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96032$		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.92997	-0.60834	
STR		-0.60834	-0.41822	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5533	11.25121	8.199874	7.558824
TRN	1119	11.07216	8.289999	7.573824
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.1083	1	6650	0.7421
Brown-Forsythe	0.0025	1	6650	0.9603
Levene	0.1294	1	6650	0.7190
Bartlett	0.4752	1	?	0.4906
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	0.0959	1	1619.4	0.7569
	t-Test			
	0.3097			

Figure A.2- 109 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



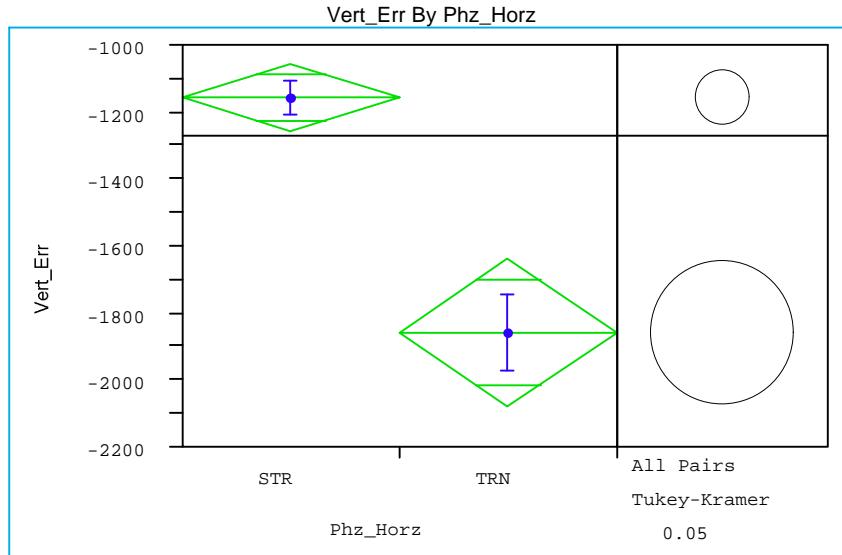
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5533	0.402110	9.50760	0.12782
TRN	1119	0.716969	8.81856	0.26362
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.314859	
STR		-0.31486	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96032		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.77864	-0.28884	
STR		-0.28884	-0.35016	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5533	9.507599	4.986602	4.918904
TRN	1119	8.818562	4.737475	4.624016
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.1621	1	6650	0.2811
Brown-Forsythe	1.2499	1	6650	0.2636
Levene	0.9054	1	6650	0.3414
Bartlett	10.1778	1	?	0.0014
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	1.1550	1	1686.6	0.2827
t-Test	1.0747			

Figure A.2- 110 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



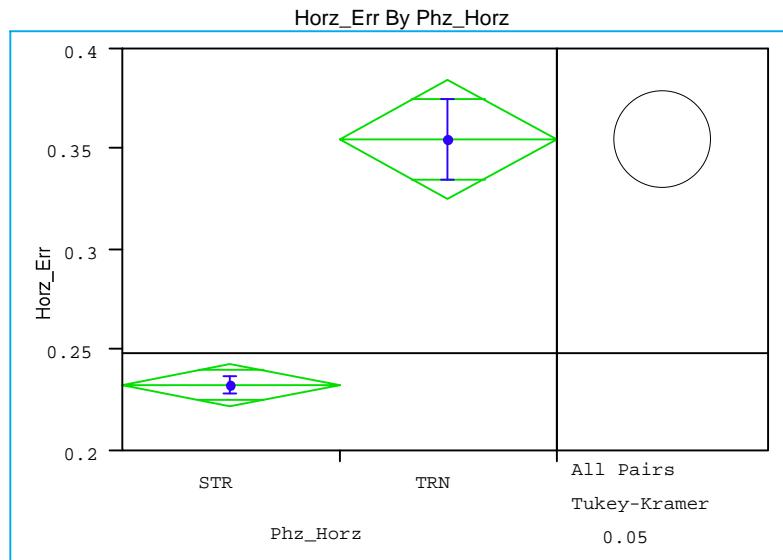
Means and Std Deviations							
Level	Number	Mean	Std Dev	Std Err Mean			
STR	5533	2.23391	12.2647	0.16488			
TRN	1119	3.41451	12.4332	0.37168			
Means Comparisons							
Dif=Mean[i]-Mean[j]			TRN	STR			
TRN			0.00000	1.18061			
STR			-1.18061	0.00000			
Alpha=		0.05					
Comparisons for all pairs using Tukey-Kramer HSD							
		$q^* = 1.96032$					
Abs(Dif)-LSD			TRN	STR			
TRN			-1.01880	0.39071			
STR			0.39071	-0.45817			
Positive values show pairs of means that are significantly different.							
Tests that the Variances are Equal							
Tests that the Variances are Equal							
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median			
STR	5533	12.26465	8.110204	8.010440			
TRN	1119	12.43317	8.499094	8.308092			
Test							
O'Brien[.5]		F Ratio	DF Num	DF Den	Prob>F		
Brown-Forsythe		0.0995	1	6650	0.7525		
Levene		0.9360	1	6650	0.3333		
Bartlett		1.6710	1	6650	0.1962		
		0.3484	1	?	0.5550		
Welch Anova testing Means Equal, allowing Std's Not Equal							
		F Ratio	DF Num	DF Den	Prob>F		
		8.4306	1	1588.9	0.0037		
		t-Test					
		2.9035					

Figure A.2- 111 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



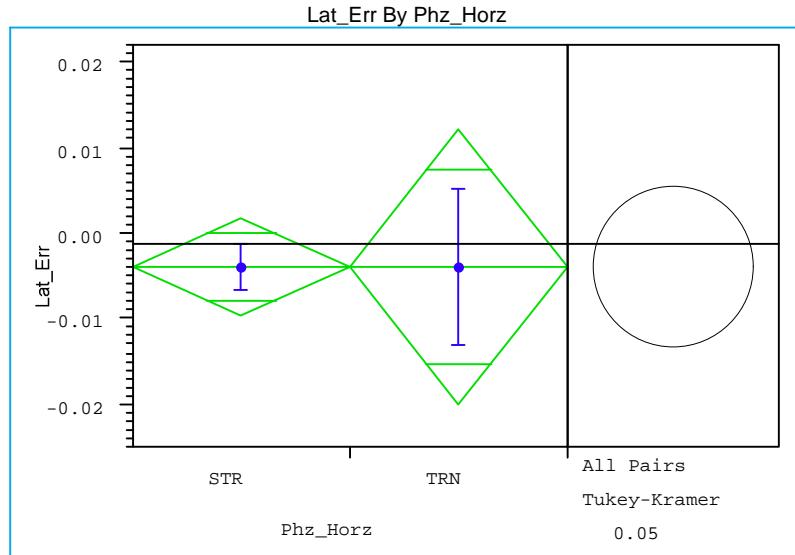
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	5533	-1148.82	3830.91	51.50
TRN	1119	-1854.55	4008.78	119.84
Means Comparisons				
Dif=Mean[i]-Mean[j]			STR	TRN
STR		0.000	705.728	
TRN		-705.728	0.000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96032		
Abs(Dif)-LSD			STR	TRN
STR		-143.915	457.614	
TRN		457.614	-320.015	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	5533	3830.906	2523.343	2077.579
TRN	1119	4008.777	3004.115	2596.993
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.9234	1	6650	0.3366
Brown-Forsythe	21.1780	1	6650	<.0001
Levene	26.5802	1	6650	<.0001
Bartlett	3.9075	1	?	0.0481
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	29.2735	1	1558.4	<.0001
t-Test				
	5.4105			

Figure A.2- 112 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



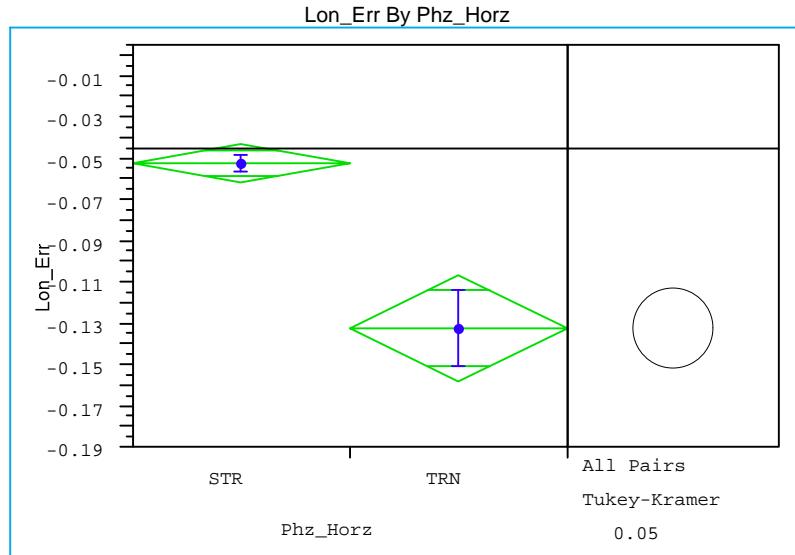
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	18660	0.234469	0.71145	0.00521
TRN	2505	0.357088	1.00994	0.02018
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.000000	0.122619	
STR		-0.12262	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		$q^* = 1.96008$		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.0417	0.091214	
STR		0.091214	-0.01528	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	18660	0.711449	0.1940809	0.1629565
TRN	2505	1.009945	0.3193173	0.2706653
Test		F Ratio	DF Num	DF Den
O'Brien[.5]		1.4391	1	21163
Brown-Forsythe		46.7234	1	21163
Levene		66.3991	1	21163
Bartlett		645.8713	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal				
		F Ratio	DF Num	DF Den
		34.6191	1	2847
		t-Test		
		5.8838		
				Prob>F
				<.0001

Figure A.2- 113 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



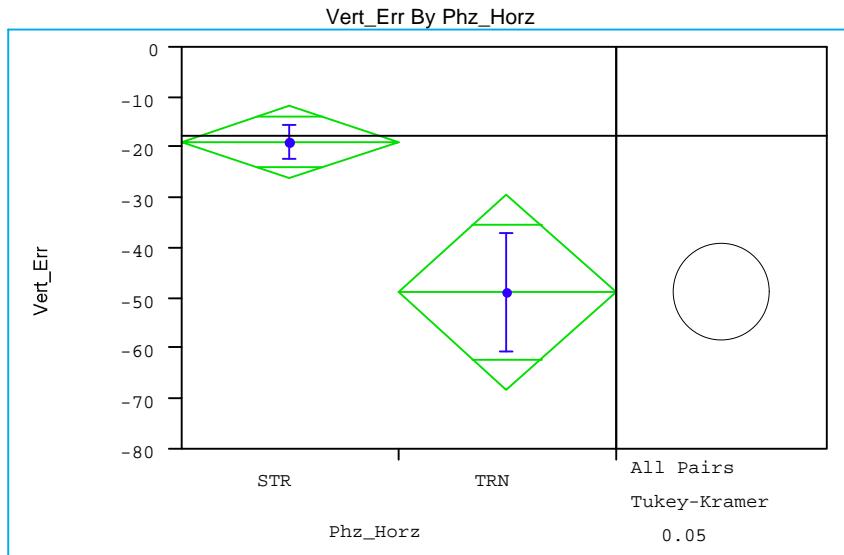
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	18660	-0.00106	0.403764	0.00296	
TRN	2505	-0.0024	0.465094	0.00929	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.001338		
TRN		-0.00134	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96008			
Abs(Dif)-LSD		STR	TRN		
STR		-0.00835	-0.01583		
TRN		-0.01583	-0.02279		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	18660	0.4037643		0.0987145	0.0987052
TRN	2505	0.4650941		0.1861093	0.1859884
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.2594	1	21163	0.6105	
Brown-Forsythe	107.4089	1	21163	<.0001	
Levene	107.6896	1	21163	<.0001	
Bartlett	94.8468	1	?	<.0001	
Welch Anova testing Means Equal, allowing Std's Not Equal					
F Ratio	DF Num	DF Den	Prob>F		
0.0188	1	3032.1	0.8909		
t-Test					
0.1372					

Figure A.2- 114 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



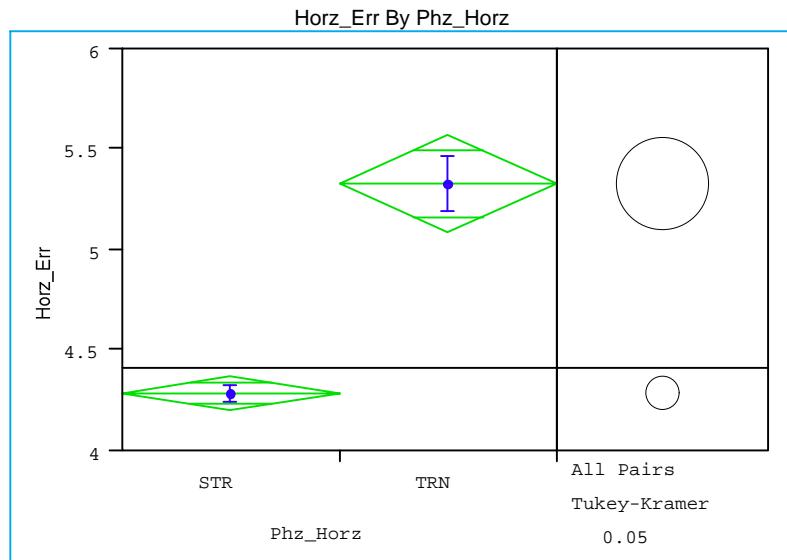
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	18660	-0.03411	0.630039	0.00461	
TRN	2505	-0.12295	0.957136	0.01912	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.088839		
TRN		-0.08884	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96008			
Abs(Dif)-LSD		STR	TRN		
STR		-0.01374	0.060601		
TRN		0.060601	-0.0375		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	18660	0.6300389		0.1795647	0.1794284
TRN	2505	0.9571364		0.2469901	0.2423914
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.7649	1	21163	0.1840	
Brown-Forsythe	20.6874	1	21163	<.0001	
Levene	23.7514	1	21163	<.0001	
Bartlett	950.6784	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
20.3944	1	2802.5	<.0001		
t-Test					
4.5160					

Figure A.2- 115 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



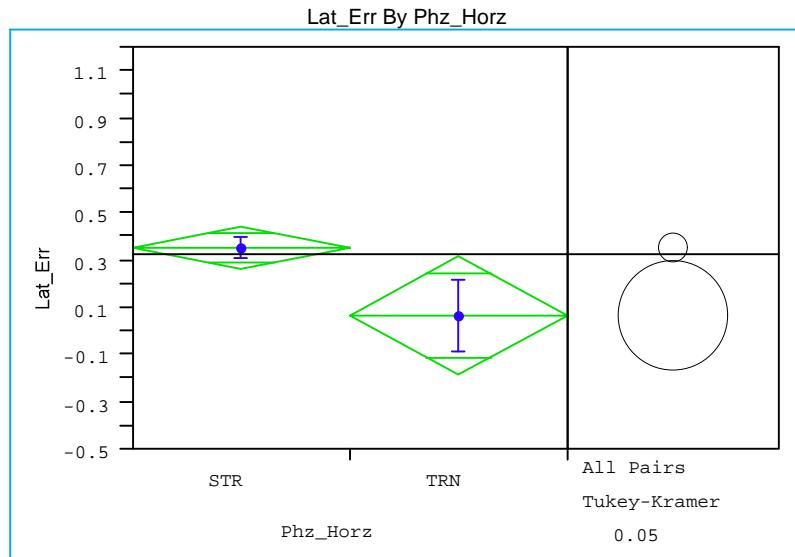
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	18660	-13.9225	485.830	3.557	
TRN	2505	-44.4052	595.086	11.890	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.0000	30.4828		
TRN		-30.4828	0.0000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96008			
Abs(Dif)-LSD		STR	TRN		
STR		-10.1463	9.6284		
TRN		9.6284	-27.6922		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	18660	485.8298		78.6304	69.61522
TRN	2505	595.0861		121.1243	93.71964
Test			F Ratio	DF Num	DF Den
O'Brien[.5]			0.7024	1	21163
Brown-Forsythe			5.2355	1	21163
Levene			16.4239	1	21163
Bartlett			201.2929	1	?
Welch Anova testing Means Equal, allowing Std's Not Equal					
			F Ratio	DF Num	Prob>F
			6.0331	1	0.0141
			t-Test		
			2.4562		

Figure A.2- 116 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



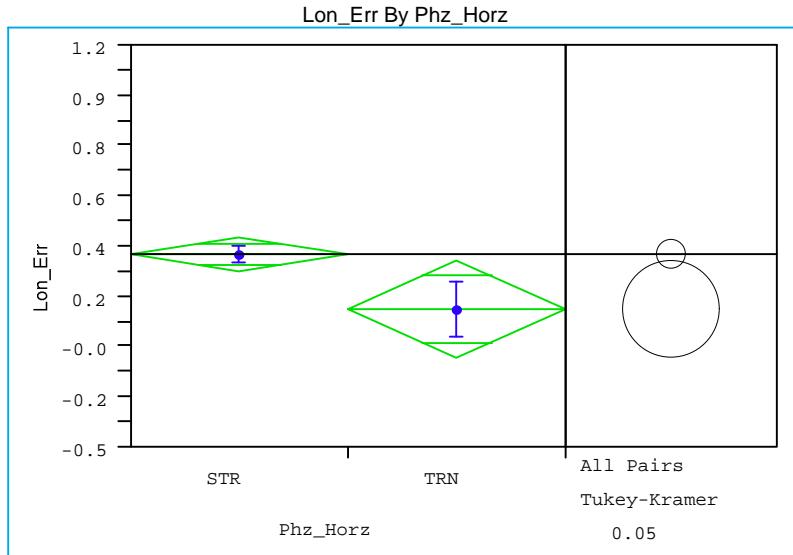
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	13124	4.29516	5.04140	0.04401
TRN	1657	5.34666	5.91720	0.14536
Means Comparisons				
Dif=Mean[i]-Mean[j]		TRN	STR	
TRN		0.00000	1.05149	
STR		-1.05149	0.00000	
Alpha= 0.05				
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96013		
Abs(Dif)-LSD		TRN	STR	
TRN		-0.3505	0.788471	
STR		0.788471	-0.12454	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	13124	5.041404	3.423732	3.080865
TRN	1657	5.917200	4.169448	3.792364
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	13.5501	1	14779	0.0002
Brown-Forsythe	37.9241	1	14779	<.0001
Levene	57.8901	1	14779	<.0001
Bartlett	81.9421	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	47.9314	1	1971.4	<.0001
t-Test	6.9232			

Figure A.2- 117 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



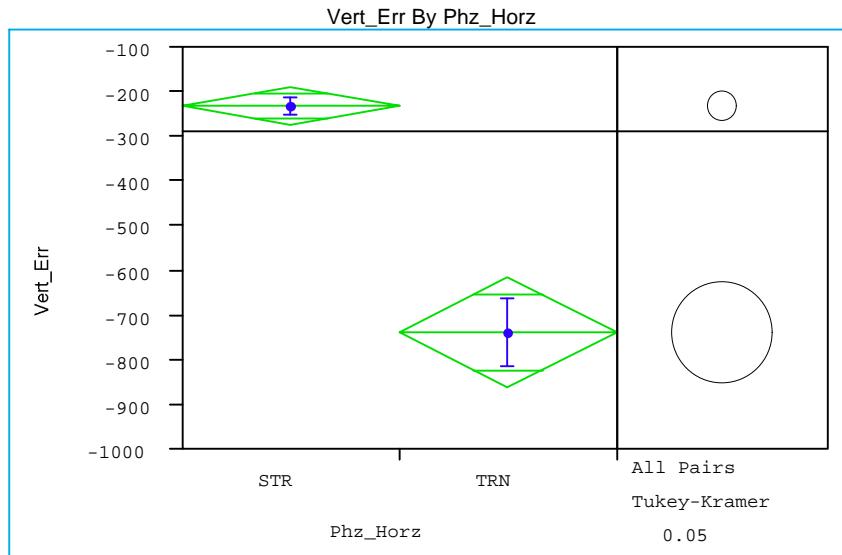
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	13124	0.361254	5.21221	0.04550	
TRN	1657	0.068356	6.43539	0.15809	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.292898		
TRN		-0.2929	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96013			
Abs(Dif)-LSD		STR	TRN		
STR		-0.12977	0.018828		
TRN		0.018828	-0.36522		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	13124	5.212211		2.717162	2.630696
TRN	1657	6.435389		3.473404	3.469688
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	27.5258	1	14779	<.0001	
Brown-Forsythe	48.4269	1	14779	<.0001	
Levene	40.3462	1	14779	<.0001	
Bartlett	145.6606	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
3.1699	1	1940	0.0752		
t-Test					
1.7804					

Figure A.2- 118 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



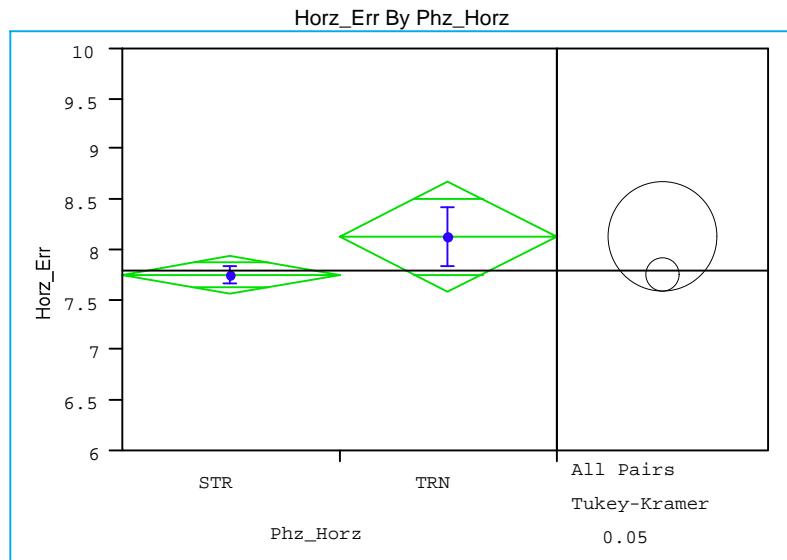
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
STR	13124	0.343574	4.05584	0.03540
TRN	1657	0.104021	4.71036	0.11572
Means Comparisons				
Dif=Mean[i]-Mean[j]		STR	TRN	
STR		0.000000	0.239553	
TRN		-0.23955	0.000000	
Alpha=		0.05		
Comparisons for all pairs using Tukey-Kramer HSD				
		q* = 1.96013		
Abs(Dif)-LSD		STR	TRN	
STR		-0.10004	0.028278	
TRN		0.028278	-0.28154	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
STR	13124	4.055844	2.536440	2.530586
TRN	1657	4.710364	3.074113	3.073069
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	11.0260	1	14779	0.0009
Brown-Forsythe	41.7386	1	14779	<.0001
Levene	41.2130	1	14779	<.0001
Bartlett	71.0945	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	3.9188	1	1978.4	0.0479
t-Test	1.9796			

Figure A.2- 119 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	13124	-228.206	2515.82	21.961	
TRN	1657	-739.485	3128.62	76.859	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000	511.279		
TRN		-511.279	0.000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96013			
Abs(Dif)-LSD		STR	TRN		
STR		-62.712	378.837		
TRN		378.837	-176.491		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	13124	2515.824		1238.933	1107.942
TRN	1657	3128.625		2023.243	1743.558
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		24.2333	1	14779	<.0001
Brown-Forsythe		110.2038	1	14779	<.0001
Levene		184.8905	1	14779	<.0001
Bartlett		156.3317	1	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
		F Ratio	DF Num	DF Den	Prob>F
		40.9118	1	1935.8	<.0001
		t-Test			
		6.3962			

Figure A.2- 120 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations		
		Mean	Std Dev	Std Err Mean
STR	7275	7.75291	8.35611	0.09797
TRN	899	8.12008	9.02906	0.30114

Means Comparisons			
Dif=Mean[i]-Mean[j]	TRN	STR	
TRN	0.000000	0.367168	
STR	-0.36717	0.000000	
 Alpha= 0.05			
Comparisons for all pairs using Tukey-Kramer HSD			
q* = 1.96026			
Abs(Dif)-LSD			
Abs(Dif)-LSD	TRN	STR	
TRN	-0.77968	-0.21722	
STR	-0.21722	-0.27408	

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

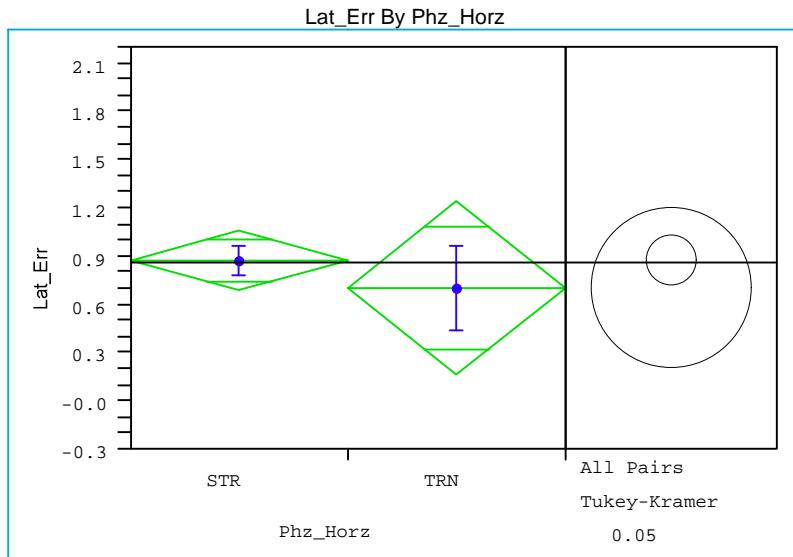
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	7275	8.356110		5.935296	5.441148
TRN	899	9.029061		6.335328	5.798658

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.9409	1	8172	0.1636
Brown-Forsythe	2.0633	1	8172	0.1509
Levene	3.6237	1	8172	0.0570
Bartlett	9.9813	1	?	0.0016

Welch Anova testing Means Equal, allowing Std's Not Equal

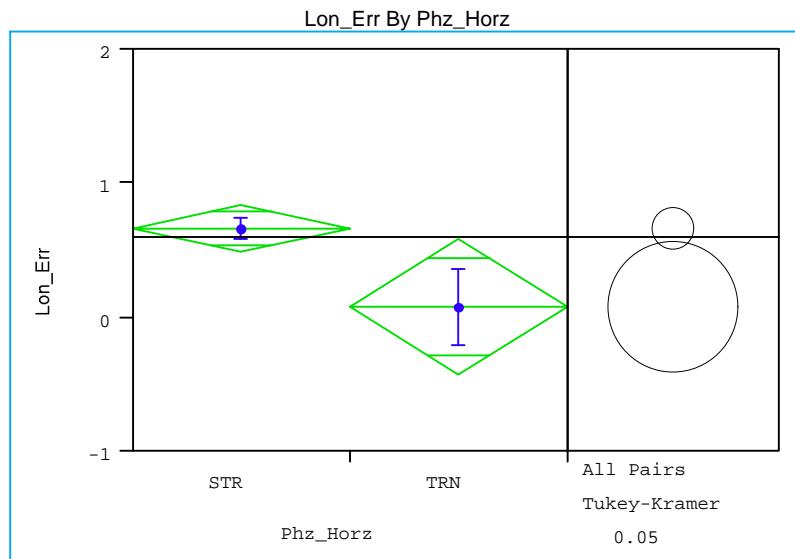
F Ratio	DF Num	DF Den	Prob>F
1.3443	1	1096.6	0.2465
t-Test			
1.1595			

Figure A.2- 121 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



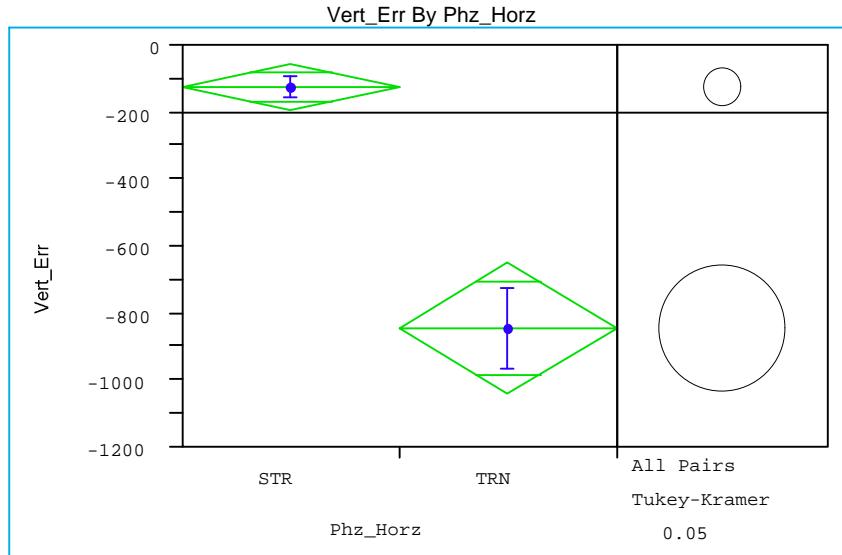
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	7275	0.883040	8.26596	0.09691	
TRN	899	0.707953	8.16178	0.27221	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.175086		
TRN		-0.17509	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96026			
Abs(Dif)-LSD		STR	TRN		
STR		-0.26829	-0.39696		
TRN		-0.39696	-0.76321		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	7275	8.265958		4.502071	4.253076
TRN	899	8.161776		4.561810	4.429300
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.0381	1	8172	0.8452	
Brown-Forsythe	0.4910	1	8172	0.4835	
Levene	0.0597	1	8172	0.8069	
Bartlett	0.2554	1	?	0.6133	
F Ratio	DF Num	DF Den	Prob>F		
0.3672	1	1137.8	0.5447		
t-Test					
0.6059					

Figure A.2- 122 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



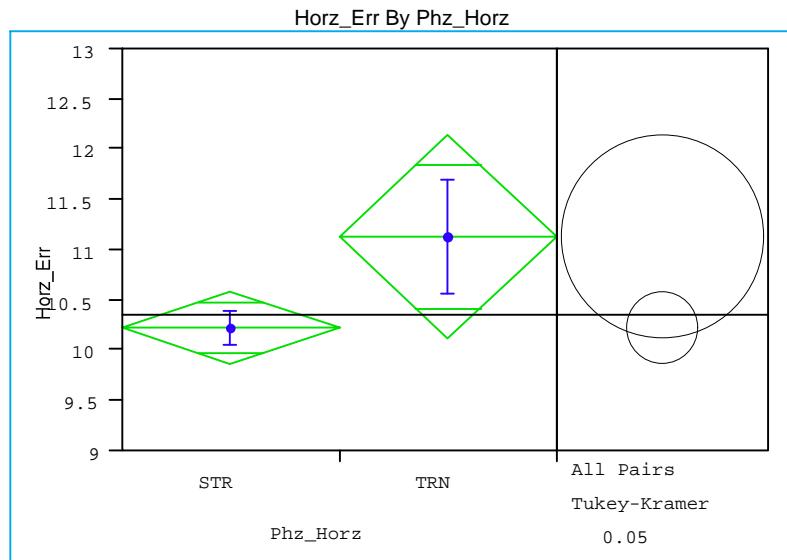
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	7275	0.771716	7.76137	0.09100	
TRN	899	0.207019	8.96514	0.29900	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.564697		
TRN		-0.5647	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96026			
Abs(Dif)-LSD		STR	TRN		
STR		-0.25685	0.017044		
TRN		0.017044	-0.73067		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	7275	7.761372		5.020612	5.006082
TRN	899	8.965141		5.380877	5.367271
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	7.4284	1	8172	0.0064	
Brown-Forsythe	2.8110	1	8172	0.0937	
Levene	2.8199	1	8172	0.0931	
Bartlett	35.8064	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
3.2644	1	1070.9	0.0711		
t-Test					
1.8068					

Figure A.2- 123 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



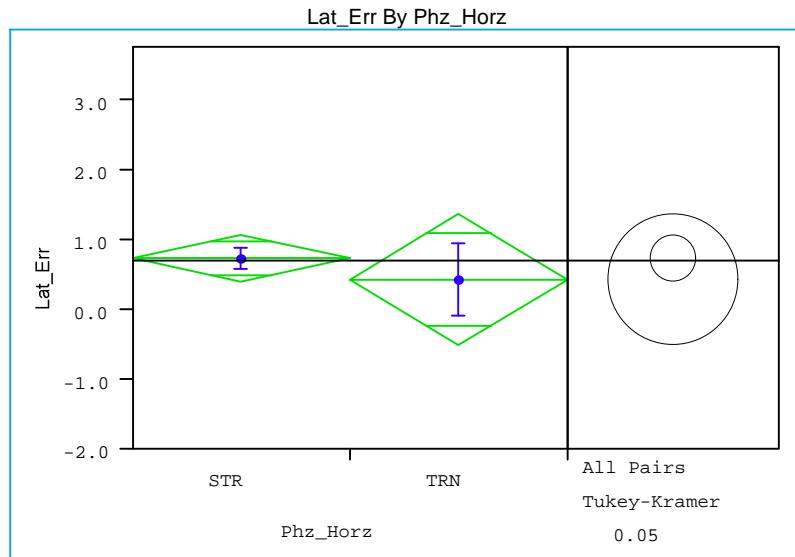
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
STR	7275	-123.003	2955.87	34.66	
TRN	899	-837.674	3769.17	125.71	
Means Comparisons					
Dif=Mean[i]-Mean[j]				STR	TRN
STR			0.000	714.671	
TRN			-714.671	0.000	
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96026			
Abs(Dif)-LSD			STR	TRN	
STR			-99.321	502.901	
TRN			502.901	-282.540	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
STR	7275	2955.871	1329.427	1257.581	
TRN	899	3769.167	2394.261	2063.472	
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	15.8051	1	8172	<.0001	
Brown-Forsythe	68.8047	1	8172	<.0001	
Levene	127.1680	1	8172	<.0001	
Bartlett	107.0770	1	?	<.0001	
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	30.0379	1	1038.9	<.0001	
t-Test	5.4807				

Figure A.2- 124 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



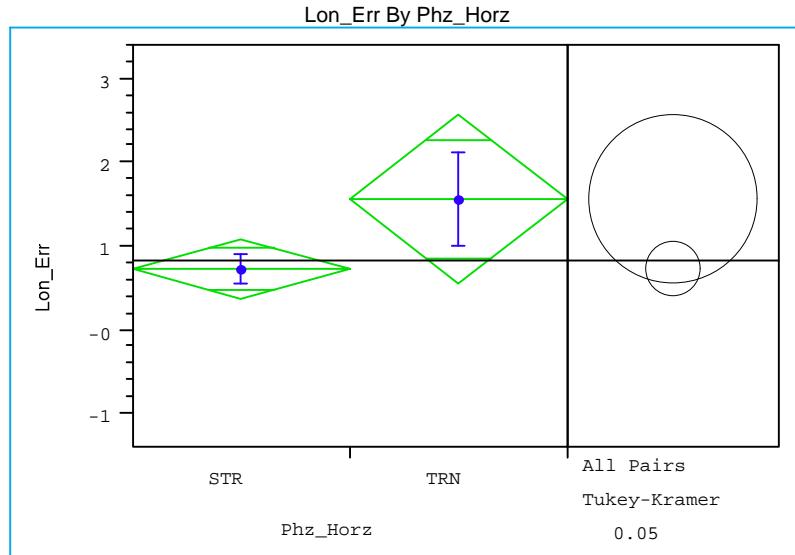
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	3466	10.2454	10.9529	0.18604	
TRN	446	11.1468	12.0732	0.57168	
Means Comparisons					
Dif=Mean[i]-Mean[j]		TRN	STR		
TRN		0.000000	0.901409		
STR		-0.90141	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 1.96057$			
Abs(Dif)-LSD		TRN	STR		
TRN		-1.45550	-0.19200		
STR		-0.19200	-0.52211		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	3466	10.95292	7.759011		7.125747
TRN	446	12.07322	8.742910		7.778772
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	1.8495	1	3910	0.1739	
Brown-Forsythe	1.9751	1	3910	0.1600	
Levene	6.2898	1	3910	0.0122	
Bartlett	7.8580	1	?	0.0051	
F Ratio	DF Num	DF Den	Prob>F		
2.2481	1	543.46	0.1344		
t-Test					
1.4994					

Figure A.2- 125 Statistical Tests for Horizontal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



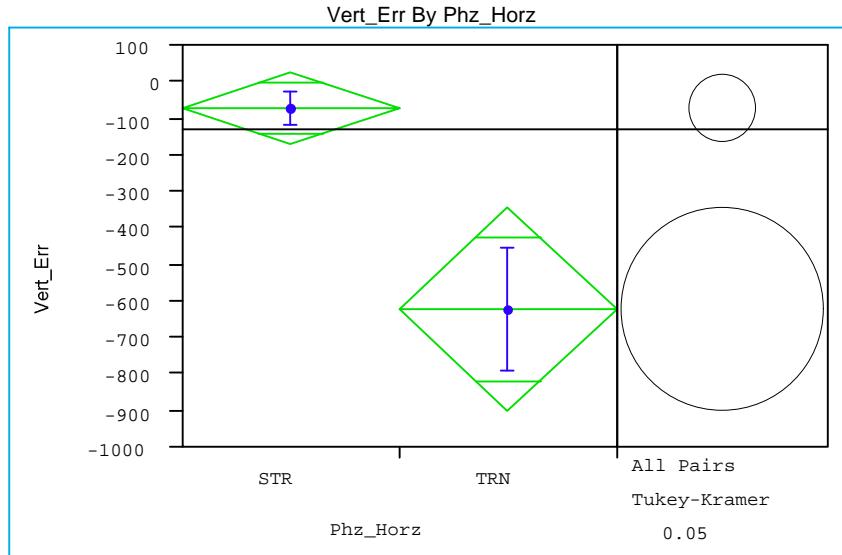
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	3466	0.739511	10.2167	0.17354	
TRN	446	0.463890	11.2007	0.53037	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000000	0.275622		
TRN		-0.27562	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96057			
Abs(Dif)-LSD		STR	TRN		
STR		-0.48666	-0.74355		
TRN		-0.74355	-1.35667		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	3466	10.21674		5.356596	5.161818
TRN	446	11.20066		5.935987	5.873975
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	0.9586	1	3910	0.3276	
Brown-Forsythe	2.5132	1	3910	0.1130	
Levene	1.7155	1	3910	0.1904	
Bartlett	6.9853	1	?	0.0082	
F Ratio	DF Num	DF Den	Prob>F		
0.2440	1	544.59	0.6216		
t-Test					
0.4939					

Figure A.2- 126 Statistical Tests for Lateral Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	3466	0.75035	10.9303	0.18566	
TRN	446	1.57443	11.9222	0.56453	
Means Comparisons					
Dif=Mean[i]-Mean[j]		TRN	STR		
TRN		0.000000	0.824080		
STR		-0.82408	0.000000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96057			
Abs(Dif)-LSD		TRN	STR		
TRN		-1.45045	-0.26553		
STR		-0.26553	-0.52030		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	3466	10.93034		7.020180	7.000370
TRN	446	11.92215		7.567985	7.456522
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		1.6369	1	3910	0.2008
Brown-Forsythe		1.1306	1	3910	0.2877
Levene		1.6508	1	3910	0.1989
Bartlett		6.2172	1	?	0.0127
Welch Anova testing Means Equal, allowing Std's Not Equal					
		F Ratio	DF Num	DF Den	Prob>F
		1.9229	1	545.65	0.1661
		t-Test			
		1.3867			

Figure A.2- 127 Statistical Tests for Longitudinal Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
STR	3466	-65.790	2982.05	50.65	
TRN	446	-620.819	3577.84	169.42	
Means Comparisons					
Dif=Mean[i]-Mean[j]		STR	TRN		
STR		0.000	555.030		
TRN		-555.030	0.000		
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		q* = 1.96057			
Abs(Dif)-LSD		STR	TRN		
STR		-143.912	253.650		
TRN		253.650	-401.185		
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
STR	3466	2982.054		1330.937	1291.321
TRN	446	3577.840		2211.662	1900.279
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	4.8857	1	3910	0.0271	
Brown-Forsythe	19.5504	1	3910	<.0001	
Levene	42.5162	1	3910	<.0001	
Bartlett	28.7096	1	?	<.0001	
F Ratio	DF Num	DF Den	Prob>F		
9.8524	1	527.57	0.0018		
t-Test					
3.1389					

Figure A.2- 128 Statistical Tests for Vertical Error and Horizontal Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

A.2.4 Vertical Phase of Flight Per Look Ahead Time

A.2.4.1 Summary Tables

Look Ahead Time	0			300		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	25326	4026	3257	21663	2333	3167
Avg. Horz. Error	0.25	0.37	0.36	2.41	3.9	3.3
Stddev. Horz. Error	0.79	1.14	0.83	3.04	3.68	3.5
Max. Horz. Error	48.02	29.51	17.72	88.45	46.09	33.42
Min. Horz. Error	0	0	0	0	0.04	0.02
Avg. Lat. Error	0	0.01	0.01	0.04	0.04	-0.09
Stddev. Lat. Error	0.37	0.72	0.58	3.08	4.19	3.98
Max. Lat. Error	18.66	22.88	8.7	46.61	30.93	26.79
Min. Lat. Error	-15.1	-11.26	-15.57	-46.12	-25.39	-22.91
Avg. Abs. Lat. Error	0.11	0.17	0.19	1.57	2.44	2.32
Stddev. Abs. Lat. Error	0.36	0.7	0.55	2.65	3.4	3.23
Max. Abs. Lat. Error	18.66	22.88	15.57	46.61	30.93	26.79
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	-0.04	-0.04	-0.12	-0.11	0.49	-0.08
Stddev. Long. Error	0.74	0.95	0.68	2.36	3.31	2.69
Max. Long. Error	47.54	18.64	4.09	22.74	46.01	14.86
Min. Long. Error	-31.16	-23.09	-15	-87.99	-18.82	-33.04
Avg. Abs. Long. Error	0.19	0.29	0.26	1.35	2.37	1.73
Stddev. Abs. Long. Error	0.72	0.91	0.64	1.94	2.36	2.06
Max. Abs. Long. Error	47.54	23.09	15	87.99	46.01	33.04
Min. Abs. Long. Error	0	0	0	0	0	0
Avg. Vert. Error	-65.84	-125.87	-321.83	-266.39	-499.48	-2337.55
Stddev. Vert. Error	566.14	1473.62	1001.71	1697.76	3286.46	2933.07
Max. Vert. Error	17000	18889	5261.11	26788.2	27290	9495.55
Min. Vert. Error	-15565.9	-31466.5	-16406.8	-18228	-24677	-17950
Avg. Abs. Vert. Error	103.29	299.9	367.97	652.46	2379.7	2889.35
Stddev. Abs. Vert. Error	560.52	1448.25	985.69	1589.85	2320.56	2391.19
Max. Abs. Vert. Error	17000	31466.46	16406.83	26788.2	27290	17950
Min. Abs. Vert. Error	0	0	0	0	0	0
Avg. Slant Range Error	0.25	0.38	0.37	2.42	3.95	3.39
Stddev. Slant Range Error	0.8	1.16	0.84	3.04	3.67	3.46
Max. Slant Range Error	48.03	29.51	17.73	88.56	46.09	33.42
Min. Slant Range Error	0	0	0	0.01	0.09	0.06

Figure A.2- 129 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	600			900		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	18016	1014	2878	14314	304	2323
Avg. Horz. Error	4.33	6.92	4.91	6.13	9.87	6.23
Stddev. Horz. Error	4.9	5.81	4.71	6.57	8.49	6.05
Max. Horz. Error	65.69	40.91	67.08	86.49	56.6	101.09
Min. Horz. Error	0.01	0.06	0.02	0.01	0.13	0.02
Avg. Lat. Error	0.29	0.45	-0.18	0.54	1.99	-0.2
Stddev. Lat. Error	4.9	6.74	5.13	6.34	10	5.58
Max. Lat. Error	55.5	38.94	33.84	60.84	54.78	31.18
Min. Lat. Error	-38.27	-33.24	-34.23	-43.96	-34.75	-64.27
Avg. Abs. Lat. Error	2.54	3.6	3.03	3.29	5.54	3.3
Stddev. Abs. Lat. Error	4.2	5.71	4.14	5.44	8.56	4.5
Max. Abs. Lat. Error	55.5	38.94	34.23	60.84	54.78	64.27
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	0.17	2.04	0.45	0.57	1.51	0.98
Stddev. Long. Error	4.32	5.66	4.45	6.32	7.97	6.58
Max. Long. Error	54.4	19.77	59.63	58.31	25.7	41.14
Min. Long. Error	-59.56	-29.72	-25.16	-83.04	-36.79	-78.02
Avg. Abs. Long. Error	2.69	4.72	3.02	4.06	6.29	4.32
Stddev. Abs. Long. Error	3.39	3.72	3.3	4.88	5.11	5.06
Max. Abs. Long. Error	59.56	29.72	59.63	83.04	36.79	78.02
Min. Abs. Long. Error	0	0.01	0	0	0	0
Avg. Vert. Error	-335.38	-539.09	-3494.58	-424.39	-189.58	-4017.92
Stddev. Vert. Error	2323.44	4371.02	3530.09	2859.83	4704.35	4223.02
Max. Vert. Error	28990	25190	10649	29003	28017	24098
Min. Vert. Error	-21075.3	-14510	-26868	-21566	-9900	-32426
Avg. Abs. Vert. Error	1030.99	3176.39	3873.94	1317.35	3121.12	4494.61
Stddev. Abs. Vert. Error	2108.99	3049.15	3108.89	2573.56	3520.43	3711.37
Max. Abs. Vert. Error	28990	25190	26868	29003	28017	32426
Min. Abs. Vert. Error	0	1	0	0	14	0.37
Avg. Slant Range Error	4.35	6.97	5.03	6.15	9.91	6.35
Stddev. Slant Range Error	4.9	5.8	4.67	6.57	8.47	6
Max. Slant Range Error	65.69	40.91	67.09	86.49	56.6	101.09
Min. Slant Range Error	0.01	0.2	0.11	0.01	0.69	0.13

Figure A.2- 130 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1200			1500		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	10969	97	1855	7967	39	1255
Avg. Horz. Error	7.81	12.2	7.67	9.48	13.87	8.75
Stddev. Horz. Error	8.11	9.5	8	9.8	9.12	9.43
Max. Horz. Error	103.04	40.57	86.73	87.22	32.25	94.14
Min. Horz. Error	0.01	0.22	0.02	0.03	0.46	0.13
Avg. Lat. Error	0.69	2.7	-0.29	0.59	2.89	-0.42
Stddev. Lat. Error	7.61	11.59	6.08	8.79	11.28	6.6
Max. Lat. Error	76.1	39.99	39.35	85.67	31.6	32.52
Min. Lat. Error	-55.56	-30.13	-44.51	-65.63	-22.26	-55.21
Avg. Abs. Lat. Error	3.94	6.67	3.6	4.48	7.33	3.93
Stddev. Abs. Lat. Error	6.54	9.84	4.91	7.59	8.98	5.32
Max. Abs. Lat. Error	76.1	39.99	44.51	85.67	31.6	55.21
Min. Abs. Lat. Error	0	0.01	0	0	0.03	0
Avg. Long. Error	1.09	2.75	1.75	1.72	4.99	2.64
Stddev. Long. Error	8.2	9.55	9.09	10.26	10.91	10.72
Max. Long. Error	53.21	26.71	77.59	86.1	25.91	94.14
Min. Long. Error	-94.35	-20.53	-85.87	-64.82	-16.12	-73.71
Avg. Abs. Long. Error	5.4	7.87	5.69	6.8	9.71	6.67
Stddev. Abs. Long. Error	6.27	6.03	7.31	7.88	6.92	8.79
Max. Abs. Long. Error	94.35	26.71	85.87	86.1	25.91	94.14
Min. Abs. Long. Error	0	0.09	0	0	0.12	0
Avg. Vert. Error	-536.07	-380.64	-4145.37	-653.47	332.41	-4355.58
Stddev. Vert. Error	3091.44	3302.06	4589.18	3216.44	2442.86	4808.4
Max. Vert. Error	29003	15050	28590	29003	5086	13797
Min. Vert. Error	-26558	-6427.62	-28868	-22800	-5981	-27901
Avg. Abs. Vert. Error	1459.99	2476.87	4756.35	1565.95	1992.82	4964.09
Stddev. Abs. Vert. Error	2777.16	2202.54	3952.07	2884.45	1416.02	4176.73
Max. Abs. Vert. Error	29003	15050	28868	29003	5981	27901
Min. Abs. Vert. Error	0	5	0	0	112	4.4
Avg. Slant Range Error	7.83	12.23	7.79	9.51	13.88	8.87
Stddev. Slant Range Error	8.1	9.48	7.95	9.79	9.11	9.38
Max. Slant Range Error	103.05	40.57	86.86	87.23	32.25	94.14
Min. Slant Range Error	0.01	0.8	0.19	0.03	0.52	0.22

Figure A.2- 131 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	1800					
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	5745	13	899			
Avg. Horz. Error	11.07	18.41	10.01			
Stddev. Horz. Error	11.37	10.83	10.11			
Max. Horz. Error	96.9	37.99	98.82			
Min. Horz. Error	0.03	3.5	0.11			
Avg. Lat. Error	0.6	8.51	-0.59			
Stddev. Lat. Error	9.59	13.95	7.83			
Max. Lat. Error	86.54	27.63	26.02			
Min. Lat. Error	-62.21	-19.27	-59.89			
Avg. Abs. Lat. Error	4.9	12.19	4.56			
Stddev. Abs. Lat. Error	8.26	10.59	6.4			
Max. Abs. Lat. Error	86.54	27.63	59.89			
Min. Abs. Lat. Error	0	0.01	0			
Avg. Long. Error	2.3	1.44	3.24			
Stddev. Long. Error	12.42	14.47	11.41			
Max. Long. Error	96.86	18.76	59.82			
Min. Long. Error	-77.43	-26.07	-78.6			
Avg. Abs. Long. Error	8.2	11.51	7.65			
Stddev. Abs. Long. Error	9.62	8.25	9.07			
Max. Abs. Long. Error	96.86	26.07	78.6			
Min. Abs. Long. Error	0	0.16	0			
Avg. Vert. Error	-741.01	1569.38	-4666.23			
Stddev. Vert. Error	3391.9	2217.34	4881.61			
Max. Vert. Error	29003	5896	6933			
Min. Vert. Error	-24600	-2690	-29635			
Avg. Abs. Vert. Error	1698.16	2148.15	5136.5			
Stddev. Abs. Vert. Error	3028.19	1608.01	4383.5			
Max. Abs. Vert. Error	29003	5896	29635			
Min. Abs. Vert. Error	0	532	0			
Avg. Slant Range Error	11.09	18.42	10.12			
Stddev. Slant Range Error	11.36	10.82	10.06			
Max. Slant Range Error	96.91	37.99	98.82			
Min. Slant Range Error	0.03	3.56	0.27			

Figure A.2- 132 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at All Altitudes

Look Ahead Time	0			300		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	17187	2208	1814	14807	1911	1733
Avg. Horz. Error	0.22	0.42	0.31	2.26	3.76	3.2
Stddev. Horz. Error	0.64	1.34	0.69	3.16	3.66	3.75
Max. Horz. Error	48.02	29.51	17.72	88.45	46.09	27.72
Min. Horz. Error	0	0	0	0	0.04	0.02
Avg. Lat. Error	0	0.03	-0.01	0.08	0.15	-0.22
Stddev. Lat. Error	0.29	0.84	0.55	3.22	4.16	4.41
Max. Lat. Error	13.61	22.88	8.7	46.61	30.93	26.79
Min. Lat. Error	-6.81	-10.95	-15.57	-46.12	-22.33	-22.91
Avg. Abs. Lat. Error	0.09	0.19	0.16	1.53	2.36	2.49
Stddev. Abs. Lat. Error	0.28	0.82	0.52	2.83	3.43	3.64
Max. Abs. Lat. Error	13.61	22.88	15.57	46.61	30.93	26.79
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	-0.04	-0.01	-0.09	-0.06	0.94	-0.05
Stddev. Long. Error	0.61	1.13	0.51	2.16	3.06	2.2
Max. Long. Error	47.54	18.64	3.56	22.18	46.01	14.86
Min. Long. Error	-31.16	-23.09	-10.07	-87.99	-16.2	-14.59
Avg. Abs. Long. Error	0.17	0.33	0.22	1.18	2.27	1.42
Stddev. Abs. Long. Error	0.59	1.08	0.47	1.81	2.25	1.69
Max. Abs. Long. Error	47.54	23.09	10.07	87.99	46.01	14.86
Min. Abs. Long. Error	0	0	0	0	0	0
Avg. Vert. Error	2.79	-23.34	-202.07	53.33	-109.4	-1861.93
Stddev. Vert. Error	262.98	1122.12	832.64	1205.18	2889.78	2960.92
Max. Vert. Error	17000	18889	5261.11	26788.2	27290	9495.55
Min. Vert. Error	-11767	-21500	-16406.8	-18228	-10819.2	-17950
Avg. Abs. Vert. Error	30.82	250.36	249.73	340.67	2048.96	2653.41
Stddev. Abs. Vert. Error	261.19	1094.07	819.6	1157.26	2040.2	2278.41
Max. Abs. Vert. Error	17000	21500	16406.83	26788.2	27290	17950
Min. Abs. Vert. Error	0	0	0	0	0	0
Avg. Slant Range Error	0.22	0.43	0.31	2.27	3.81	3.3
Stddev. Slant Range Error	0.64	1.35	0.7	3.16	3.65	3.72
Max. Slant Range Error	48.03	29.51	17.73	88.56	46.09	27.72
Min. Slant Range Error	0	0	0	0.01	0.09	0.06

Figure A.2- 133 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	600			900		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	12322	945	1540	9768	289	1160
Avg. Horz. Error	4.16	6.99	4.82	6.05	9.94	5.79
Stddev. Horz. Error	5.02	5.93	5.21	6.8	8.59	5.61
Max. Horz. Error	57.5	40.91	67.08	75.25	56.6	43.7
Min. Horz. Error	0.01	0.06	0.02	0.01	0.13	0.06
Avg. Lat. Error	0.4	0.63	-0.42	0.76	2.04	-0.44
Stddev. Lat. Error	5.17	6.84	5.77	6.88	10.17	5.87
Max. Lat. Error	55.5	38.94	33.84	60.84	54.78	31.18
Min. Lat. Error	-38.27	-33.24	-34.23	-43.96	-34.75	-35.37
Avg. Abs. Lat. Error	2.57	3.61	3.38	3.48	5.66	3.5
Stddev. Abs. Lat. Error	4.5	5.84	4.7	5.98	8.69	4.74
Max. Abs. Lat. Error	55.5	38.94	34.23	60.84	54.78	35.37
Min. Abs. Lat. Error	0	0	0	0	0	0
Avg. Long. Error	0.17	2.35	0.2	0.4	1.84	0.37
Stddev. Long. Error	3.96	5.61	4.11	5.89	7.87	5.5
Max. Long. Error	54.4	19.77	59.63	58.31	25.7	41.14
Min. Long. Error	-28	-29.72	-21.01	-61.99	-36.79	-21.74
Avg. Abs. Long. Error	2.44	4.77	2.56	3.75	6.28	3.58
Stddev. Abs. Long. Error	3.13	3.77	3.23	4.57	5.08	4.19
Max. Abs. Long. Error	54.4	29.72	59.63	61.99	36.79	41.14
Min. Abs. Long. Error	0	0.03	0	0	0	0
Avg. Vert. Error	65.83	-380.28	-3032.69	98.92	-84.47	-3397.46
Stddev. Vert. Error	2040.95	4319.61	3379.09	2565.73	4762.72	4004.29
Max. Vert. Error	28990	25190	10649	29003	28017	24098
Min. Vert. Error	-13004	-14510	-16708	-17000	-9900	-20550
Avg. Abs. Vert. Error	736.19	3083.65	3537.88	972.68	3135.07	4068.74
Stddev. Abs. Vert. Error	1904.67	3047.09	2845.48	2376.24	3581.59	3319.36
Max. Abs. Vert. Error	28990	25190	16708	29003	28017	24098
Min. Abs. Vert. Error	0	1	0	0	14	13.63
Avg. Slant Range Error	4.18	7.04	4.93	6.07	9.99	5.9
Stddev. Slant Range Error	5.02	5.92	5.17	6.79	8.57	5.56
Max. Slant Range Error	57.5	40.91	67.09	75.4	56.6	43.71
Min. Slant Range Error	0.01	0.2	0.11	0.01	0.69	0.13

Figure A.2- 134 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

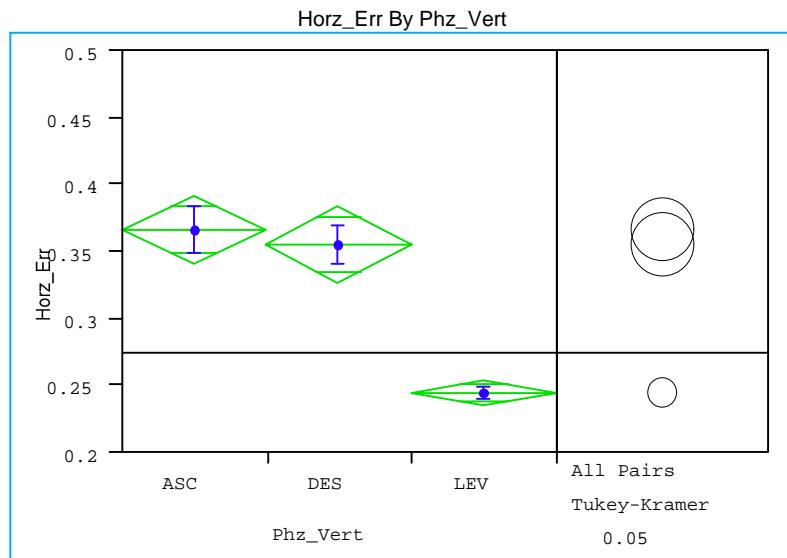
Look Ahead Time	1200			1500		
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	7238	95	856	5111	36	558
Avg. Horz. Error	7.78	12.32	7.42	9.22	13.88	8
Stddev. Horz. Error	8.38	9.55	8.56	10.02	9.28	7.69
Max. Horz. Error	78.4	40.57	86.73	87.22	32.25	64.14
Min. Horz. Error	0.01	0.22	0.02	0.03	0.46	0.13
Avg. Lat. Error	1	2.79	-0.51	0.93	3.19	-0.88
Stddev. Lat. Error	8.35	11.69	6.58	9.7	11.66	6.9
Max. Lat. Error	76.1	39.99	39.35	85.67	31.6	21.76
Min. Lat. Error	-55.56	-30.13	-36.62	-65.63	-22.26	-41.85
Avg. Abs. Lat. Error	4.28	6.77	3.89	4.87	7.71	4.24
Stddev. Abs. Lat. Error	7.24	9.92	5.33	8.44	9.24	5.52
Max. Abs. Lat. Error	76.1	39.99	39.35	85.67	31.6	41.85
Min. Abs. Lat. Error	0	0.01	0	0	0.03	0
Avg. Long. Error	0.66	2.72	0.81	0.8	4.3	0.64
Stddev. Long. Error	7.71	9.62	9.17	9.49	10.89	8.62
Max. Long. Error	53.21	26.71	77.59	61.01	25.91	63.91
Min. Long. Error	-48.76	-20.53	-85.87	-61.99	-16.12	-32.01
Avg. Abs. Long. Error	5.01	7.91	5.14	6.13	9.41	5.53
Stddev. Abs. Long. Error	5.9	6.05	7.64	7.29	6.83	6.65
Max. Abs. Long. Error	53.21	26.71	85.87	61.99	25.91	63.91
Min. Abs. Long. Error	0	0.09	0.01	0	0.12	0
Avg. Vert. Error	187.11	-408.74	-3460.7	160.58	433.06	-3346.38
Stddev. Vert. Error	2586.64	3331.19	4468.07	2589.52	2245.76	4315.48
Max. Vert. Error	29003	15050	28590	29003	5086	13797
Min. Vert. Error	-16883	-6427.62	-19633	-17000	-3589	-20550
Avg. Abs. Vert. Error	972.97	2508.94	4350.88	997.14	1893.33	4259.77
Stddev. Abs. Vert. Error	2403.93	2214.49	3605.79	2395.19	1244.66	3415.18
Max. Abs. Vert. Error	29003	15050	28590	29003	5086	20550
Min. Abs. Vert. Error	0	5	0	0	183	4.4
Avg. Slant Range Error	7.79	12.34	7.54	9.24	13.89	8.09
Stddev. Slant Range Error	8.38	9.54	8.51	10.02	9.26	7.65
Max. Slant Range Error	78.4	40.57	86.86	87.23	32.25	64.17
Min. Slant Range Error	0.01	0.8	0.21	0.03	0.52	0.22

Figure A.2- 135 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

Look Ahead Time	1800					
Vertical Phase of Flight	Level	Ascent	Descent	Level	Ascent	Descent
Sample Quantity	3512	13	392			
Avg. Horz. Error	10.51	18.41	8.56			
Stddev. Horz. Error	11.37	10.83	7.71			
Max. Horz. Error	87.65	37.99	51.25			
Min. Horz. Error	0.03	3.5	0.11			
Avg. Lat. Error	0.91	8.51	-1.33			
Stddev. Lat. Error	10.49	13.95	8.21			
Max. Lat. Error	86.54	27.63	20.43			
Min. Lat. Error	-62.21	-19.27	-51.14			
Avg. Abs. Lat. Error	5.25	12.19	4.93			
Stddev. Abs. Lat. Error	9.13	10.59	6.7			
Max. Abs. Lat. Error	86.54	27.63	51.14			
Min. Abs. Lat. Error	0	0.01	0			
Avg. Long. Error	0.79	1.44	1.22			
Stddev. Long. Error	11.33	14.47	7.88			
Max. Long. Error	77.47	18.76	37.81			
Min. Long. Error	-58.65	-26.07	-23.84			
Avg. Abs. Long. Error	7.19	11.51	5.66			
Stddev. Abs. Long. Error	8.79	8.25	5.62			
Max. Abs. Long. Error	77.47	26.07	37.81			
Min. Abs. Long. Error	0	0.16	0			
Avg. Vert. Error	268.41	1569.38	-3744.79			
Stddev. Vert. Error	2605.18	2217.34	4239.04			
Max. Vert. Error	29003	5896	6933			
Min. Vert. Error	-16883	-2690	-17851			
Avg. Abs. Vert. Error	1009.74	2148.15	4462.2			
Stddev. Abs. Vert. Error	2416.44	1608.01	3473.71			
Max. Abs. Vert. Error	29003	5896	17851			
Min. Abs. Vert. Error	0	532	0			
Avg. Slant Range Error	10.53	18.42	8.65			
Stddev. Slant Range Error	11.37	10.82	7.67			
Max. Slant Range Error	87.65	37.99	51.27			
Min. Slant Range Error	0.03	3.56	0.27			

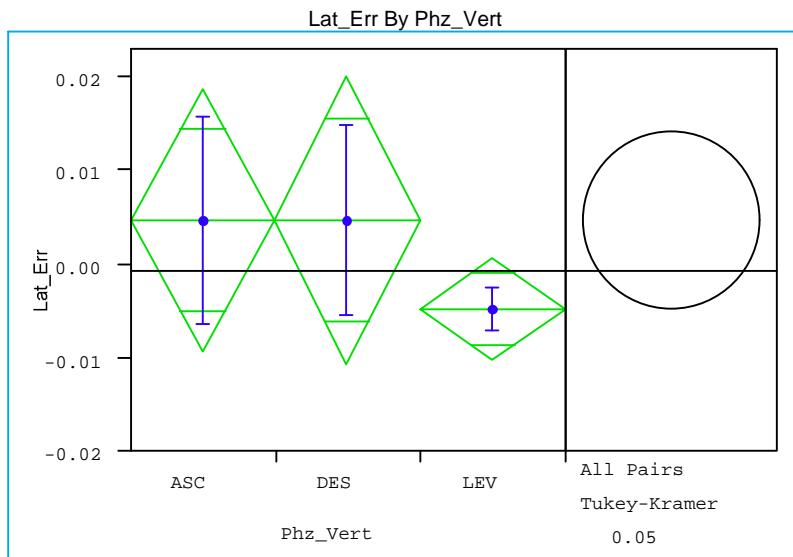
Figure A.2- 136 Descriptive Statistics for Vertical Phase of Flight per Look Ahead Time for Samples at Altitudes Above 18,000 Feet

A.2.4.2 Statistical Tests



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	4019	0.370118	1.13606	0.01792	
DES	3252	0.362882	0.83058	0.01456	
LEV	25288	0.249126	0.79500	0.00500	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.000000	0.007236	0.120993	
DES		-0.00724	0.000000	0.113756	
LEV		-0.12099	-0.11376	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 2.34381$			
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.04434	-0.03964	0.087242	
DES		-0.03964	-0.04929	0.076730	
LEV		0.087242	0.076730	-0.01768	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	4019	1.136064	0.3380860	0.2813107	
DES	3252	0.830579	0.3257492	0.2739248	
LEV	25288	0.795003	0.2205126	0.1819284	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		2.3366	2	32556	0.0967
Brown-Forsythe		37.5207	2	32556	<.0001
Levene		54.2052	2	32556	<.0001
Bartlett		523.9514	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	44.5759	2	5691.2	<.0001	

Figure A.2- 137 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	4019	0.007652	0.716016	0.01129
DES	3252	0.007661	0.582285	0.01021
LEV	25288	-0.00172	0.375069	0.00236

Means Comparisons			
Dif=Mean[i]-Mean[j]	DES	ASC	LEV
DES	0.000000	0.000009	0.009380
ASC	-9.13e-6	0.000000	0.009371
LEV	-0.00938	-0.00937	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34381$	
Abs(Dif)-LSD	
DES	DES
ASC	-0.02641
LEV	-0.02511
	ASC
DES	-0.02511
ASC	-0.02375
LEV	-0.00871
	LEV
LEV	-0.01046
	-0.00871
	-0.00947

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

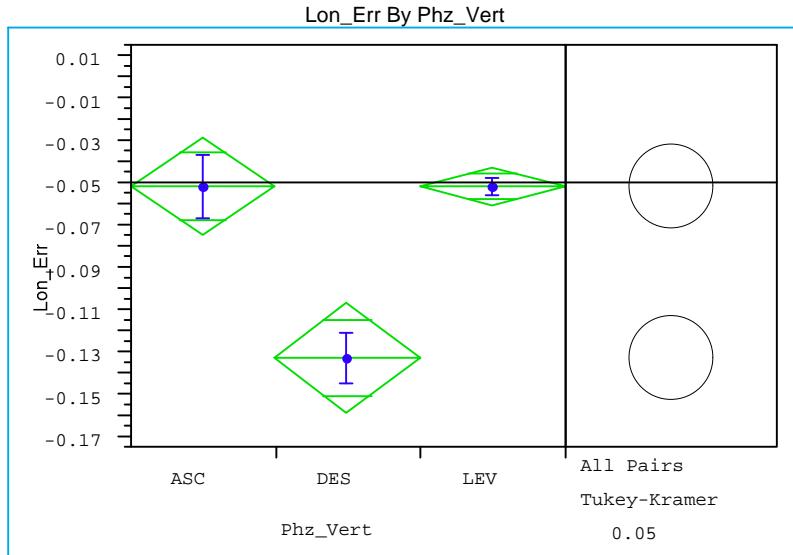
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	4019	0.7160160	0.1714768	0.1705436
DES	3252	0.5822854	0.1895395	0.1883966
LEV	25288	0.3750692	0.1111693	0.1111493

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	11.6147	2	32556	<.0001
Brown-Forsythe	69.0923	2	32556	<.0001
Levene	71.2014	2	32556	<.0001
Bartlett	2211.8958	2	?	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.6983	2	5247.3	0.4975

Figure A.2- 138 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	4019	-0.04291	0.955554	0.01507
DES	3252	-0.11723	0.684633	0.01201
LEV	25288	-0.04202	0.742731	0.00467

Means Comparisons			
Dif=Mean[i]-Mean[j]	LEV	ASC	DES
LEV	0.000000	0.000891	0.075202
ASC	-0.00089	0.000000	0.074311
DES	-0.0752	-0.07431	0.000000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34381$	
Abs(Dif)-LSD	
LEV	-0.01598
ASC	-0.02963
DES	0.041721
LEV	-0.02963
ASC	-0.04009
DES	0.031921
LEV	-0.04457

Positive values show pairs of means that are significantly different.

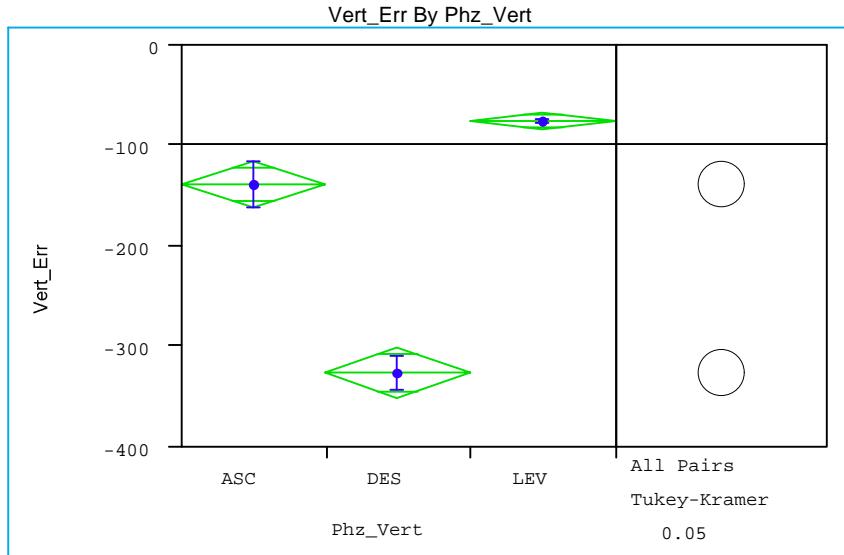
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	4019	0.9555537	0.2802567	0.2797467
DES	3252	0.6846330	0.2566226	0.2492945
LEV	25288	0.7427308	0.1867056	0.1866858

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.9426	2	32556	0.3896
Brown-Forsythe	34.2053	2	32556	<.0001
Levene	36.6214	2	32556	<.0001
Bartlett	290.5073	2	?	<.0001

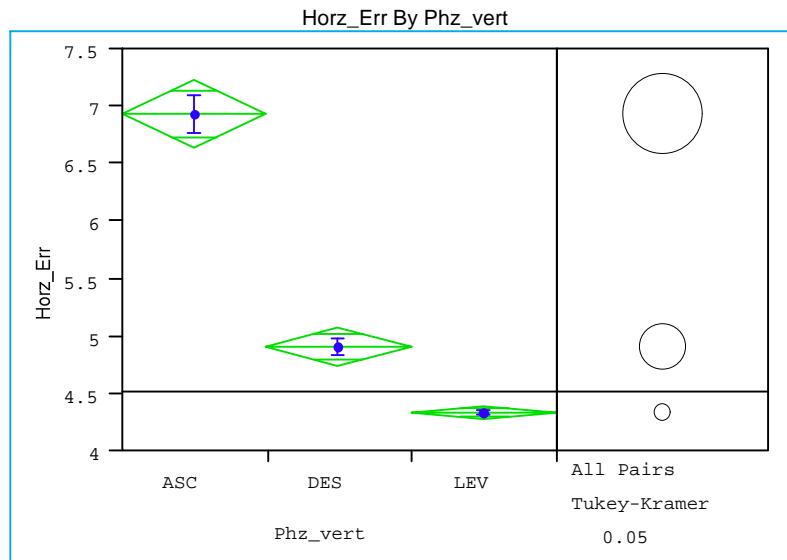
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	17.2019	2	5911.8	<.0001

Figure A.2- 139 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



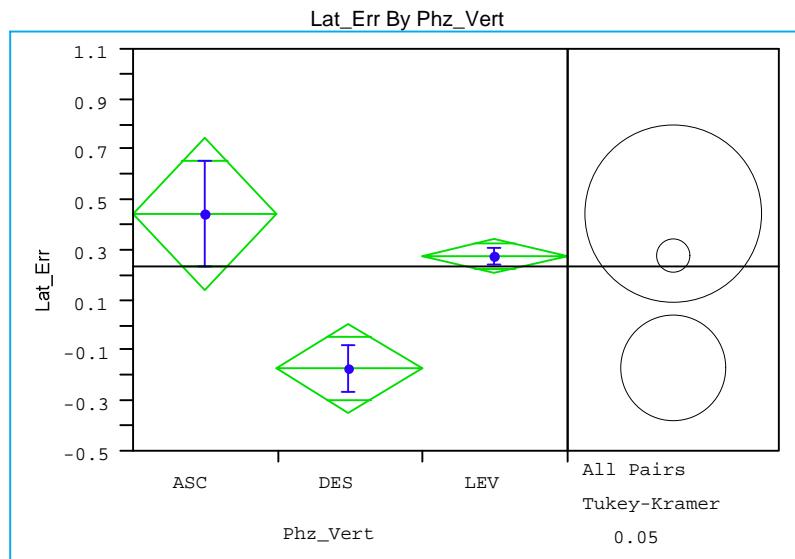
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	4019	-126.129	1474.88	23.265	
DES	3252	-322.302	1002.40	17.578	
LEV	25288	-65.622	563.81	3.545	
Means Comparisons					
Dif=Mean[i]-Mean[j]		LEV	ASC	DES	
LEV		0.000	60.507	256.679	
ASC		-60.507	0.000	196.173	
DES		-256.679	-196.173	0.000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34381$				
Abs(Dif)-LSD		LEV	ASC	DES	
LEV		-16.356	29.276	222.418	
ASC		29.276	-41.027	152.794	
DES		222.418	152.794	-45.609	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	4019	1474.884	335.4700	298.8143	
DES	3252	1002.402	398.4713	335.1945	
LEV	25288	563.811	145.4466	103.0482	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		37.7008	2	32556	<.0001
Brown-Forsythe		215.7726	2	32556	<.0001
Levene		242.3140	2	32556	<.0001
Bartlett		5026.4204	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	104.7353	2	5100.8	<.0001	

Figure A.2- 140 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at All Altitudes



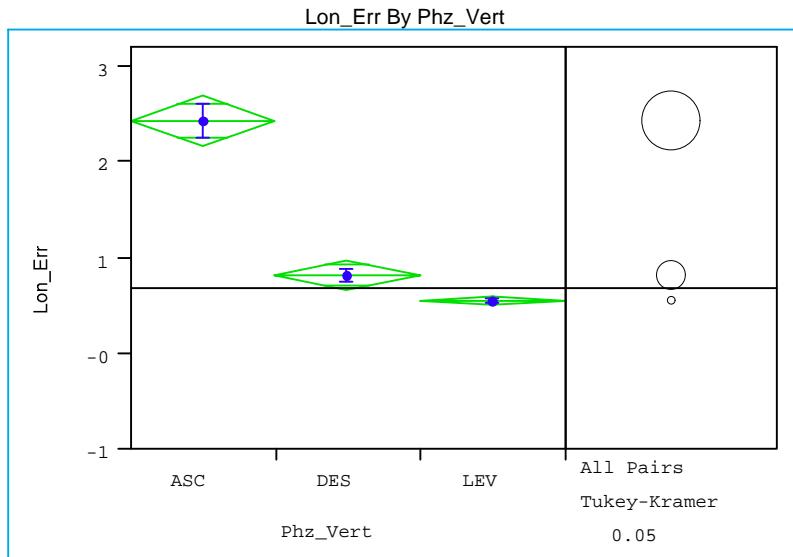
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	1014	6.92099	5.81365	0.18257	
DES	2875	4.90505	4.70164	0.08769	
LEV	17990	4.33287	4.90285	0.03655	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.00000	2.01594	2.58812	
DES		-2.01594	0.00000	0.57218	
LEV		-2.58812	-0.57218	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34386$				
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.51246	1.59450	2.21569	
DES		1.59450	-0.30434	0.34042	
LEV		2.21569	0.34042	-0.12166	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	1014	5.813647	4.087130	3.937372	
DES	2875	4.701637	3.268421	3.065992	
LEV	17990	4.902850	3.396693	3.078998	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		6.1194	2	21876	0.0022
Brown-Forsythe		20.7468	2	21876	<.0001
Levene		20.9098	2	21876	<.0001
Bartlett		37.5879	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	109.0111	2	2259.5	<.0001	

Figure A.2- 141 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



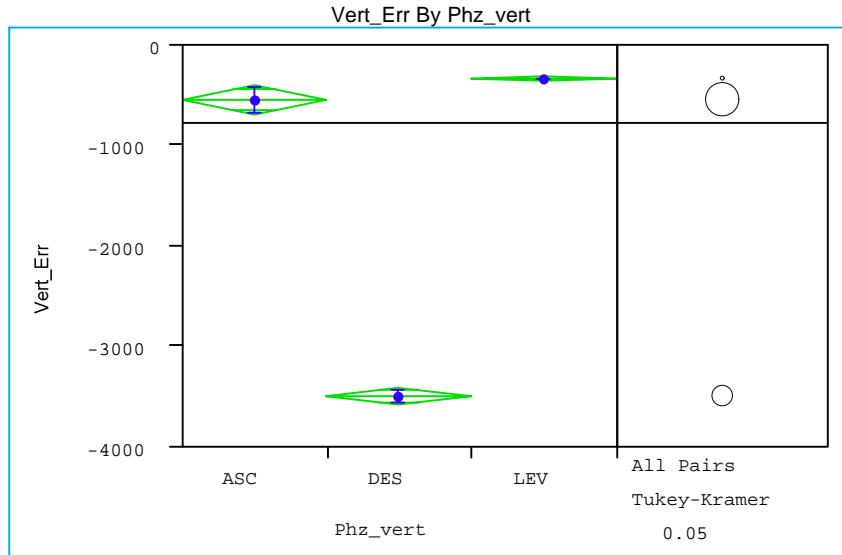
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	1014	0.451527	6.73740	0.21158	
DES	2875	-0.17616	5.13148	0.09570	
LEV	17990	0.289807	4.89881	0.03652	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.000000	0.161720	0.627690	
LEV		-0.16172	0.000000	0.465970	
DES		-0.62769	-0.46597	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34386$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-0.52354	-0.21877	0.197128	
LEV		-0.21877	-0.1243	0.229198	
DES		0.197128	0.229198	-0.31092	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	1014	6.737396	3.656798	3.600371	
DES	2875	5.131484	3.037528	3.028863	
LEV	17990	4.898810	2.596783	2.543725	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		26.5479	2	21876	<.0001
Brown-Forsythe		41.9461	2	21876	<.0001
Levene		40.3832	2	21876	<.0001
Bartlett		119.6425	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	10.8745	2	2211.1	<.0001	

Figure A.2- 142 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



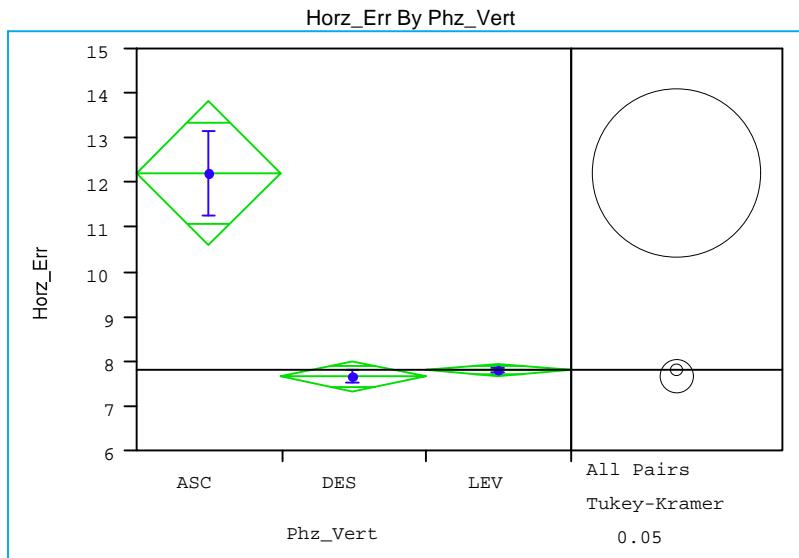
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	1014	2.03590	5.65689	0.17765	
DES	2875	0.43200	4.42983	0.08262	
LEV	17990	0.17391	4.32437	0.03224	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.00000	1.60389	1.86198	
DES		-1.60389	0.00000	0.25809	
LEV		-1.86198	-0.25809	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34386$				
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.45893	1.22647	1.52845	
DES		1.22647	-0.27255	0.05054	
LEV		1.52845	0.05054	-0.10896	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	1014	5.656888	4.274895	4.269476	
DES	2875	4.429833	2.968034	2.966377	
LEV	17990	4.324370	2.691423	2.690756	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		15.8088	2	21876	<.0001
Brown-Forsythe		108.0990	2	21876	<.0001
Levene		108.8836	2	21876	<.0001
Bartlett		81.5364	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	55.6820	2	2224.6	<.0001	

Figure A.2- 143 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



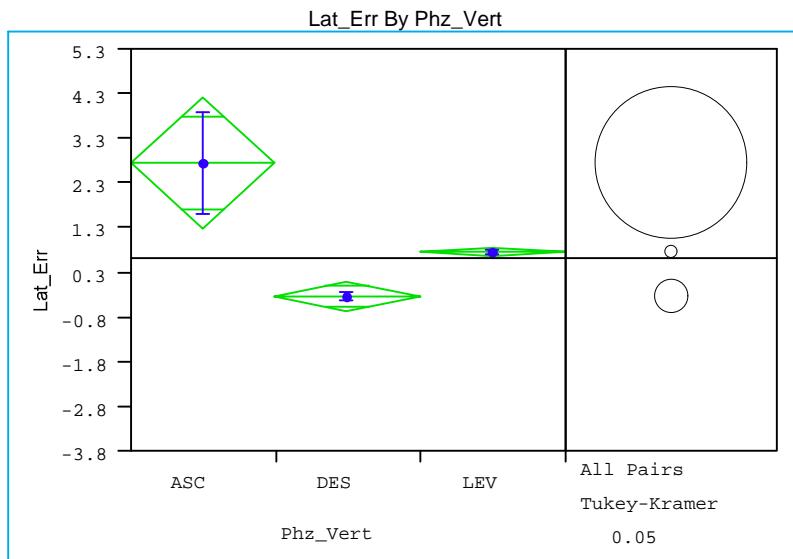
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	1014	-539.09	4371.02	137.27	
DES	2875	-3485.95	3520.40	65.66	
LEV	17990	-335.96	2325.02	17.33	
Means Comparisons					
Dif=Mean[i]-Mean[j]		LEV	ASC	DES	
LEV		0.00	203.13	3149.99	
ASC		-203.13	0.00	2946.86	
DES		-3149.99	-2946.86	0.00	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34386$				
Abs(Dif)-LSD		LEV	ASC	DES	
LEV		-65.19	3.57	3025.81	
ASC		3.57	-274.58	2721.04	
DES		3025.81	2721.04	-163.07	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	1014	4371.022	3055.845	3004.434	
DES	2875	3520.404	2667.354	2646.650	
LEV	17990	2325.024	1222.506	1032.262	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		227.5370	2	21876	<.0001
Brown-Forsythe		965.9416	2	21876	0.0000
Levene		889.3714	2	21876	0.0000
Bartlett		929.3615	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	1075.5693	2	2110.7	0.0000	

Figure A.2- 144 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at All Altitudes



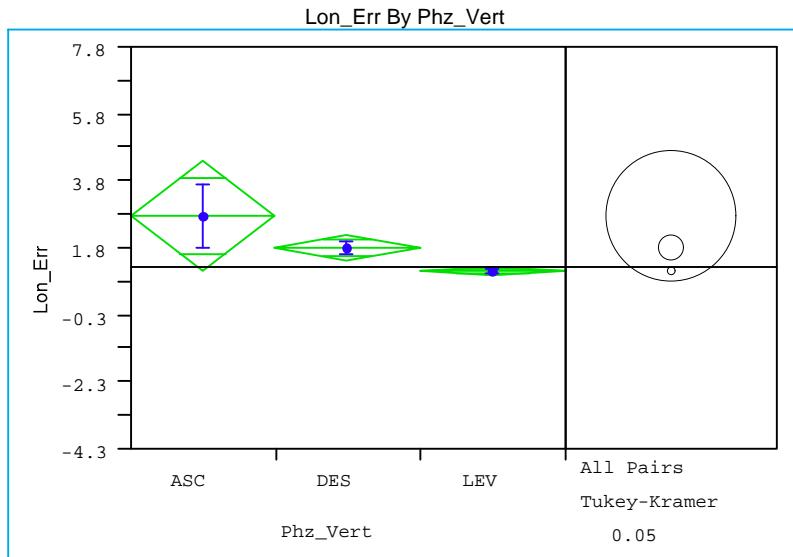
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	97	12.2024	9.49693	0.96427	
DES	1855	7.6666	8.00219	0.18580	
LEV	10954	7.8108	8.11594	0.07754	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	4.39161	4.53580	
LEV		-4.39161	0.00000	0.14419	
DES		-4.53580	-0.14419	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 2.34397$			
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-2.72991	2.45274	2.55564	
LEV		2.45274	-0.25689	-0.33313	
DES		2.55564	-0.33313	-0.62426	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	97	9.496933	7.517472	7.247739	
DES	1855	8.002193	5.154240	4.824625	
LEV	10954	8.115937	5.901777	5.451606	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		0.5803	2	12903	0.5598
Brown-Forsythe		10.8876	2	12903	<.0001
Levene		18.3378	2	12903	<.0001
Bartlett		2.9950	2	?	0.0500
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	10.6430	2	249.29	<.0001	

Figure A.2- 145 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	97	2.70167	11.5912	1.1769	
DES	1855	-0.29394	6.0832	0.1412	
LEV	10954	0.68794	7.6128	0.0727	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	2.01373	2.99561	
LEV		-2.01373	0.00000	0.98188	
DES		-2.99561	-0.98188	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34397$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-2.50773	0.23266	1.17661	
LEV		0.23266	-0.23598	0.54340	
DES		1.17661	0.54340	-0.57345	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	97	11.59116	7.512274	6.667173	
DES	1855	6.08316	3.632251	3.603511	
LEV	10954	7.61284	4.116118	3.946437	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		14.9438	2	12903	<.0001
Brown-Forsythe		11.4096	2	12903	<.0001
Levene		19.6871	2	12903	<.0001
Bartlett		97.6154	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	20.8162	2	249.32	<.0001	

Figure A.2- 146 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	97	2.74775	9.55421	0.97008
DES	1855	1.74545	9.09419	0.21115
LEV	10954	1.09250	8.20124	0.07836

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.00000	1.00230	1.65525
DES	-1.00230	0.00000	0.65296
LEV	-1.65525	-0.65296	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34397$	
Abs(Dif)-LSD	
ASC	ASC
DES	-2.80910
LEV	-1.03531
	DES
ASC	-1.03531
DES	-0.64236
LEV	0.16178
	LEV
ASC	-0.33986
DES	0.16178
LEV	-0.26434

Positive values show pairs of means that are significantly different.

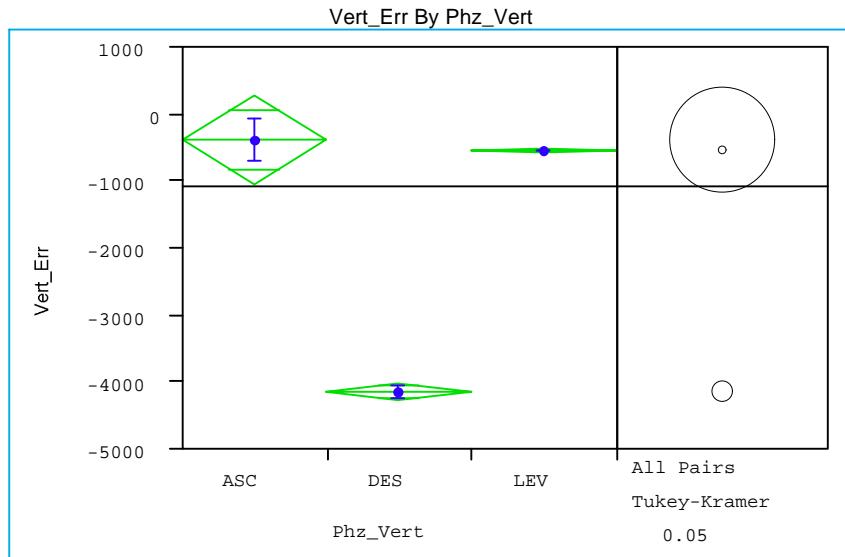
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	97	9.554211	7.570830	7.564773
DES	1855	9.094186	5.574221	5.554658
LEV	10954	8.201244	5.388095	5.365922

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.0377	2	12903	0.0177
Brown-Forsythe	6.2877	2	12903	0.0019
Levene	6.2617	2	12903	0.0019
Bartlett	19.6847	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	5.5004	2	248.83	0.0046

Figure A.2- 147 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	97	-380.64	3302.06	335.27
DES	1855	-4145.37	4589.18	106.55
LEV	10954	-536.90	3093.46	29.56
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	LEV	DES
ASC		0.00	156.26	3764.73
LEV		-156.26	0.00	3608.47
DES		-3764.73	-3608.47	0.00
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD		ASC	LEV	DES
ASC		-1127.93	-644.83	2946.58
LEV		-644.83	-106.14	3411.25
DES		2946.58	3411.25	-257.93

Positive values show pairs of means that are significantly different.

Tests that the Variances are Equal

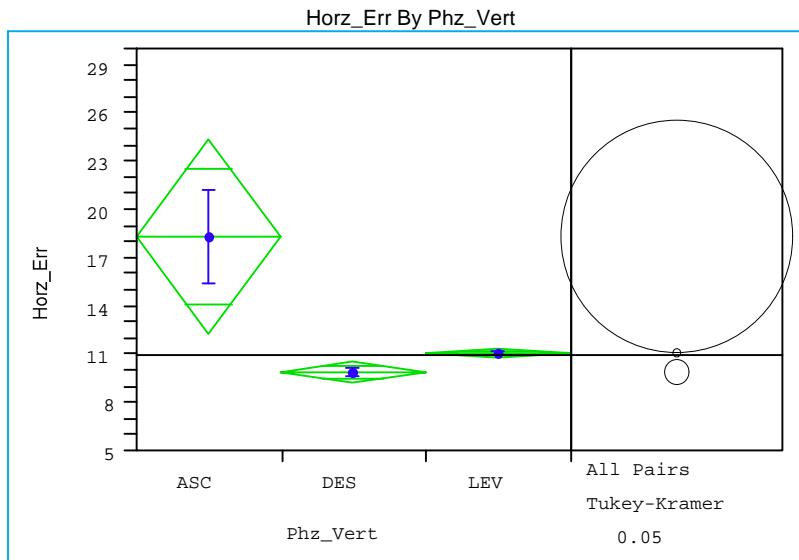
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	97	3302.064	2423.605	2407.041
DES	1855	4589.176	3334.635	3306.054
LEV	10954	3093.459	1740.157	1461.890

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	68.3927	2	12903	<.0001
Brown-Forsythe	336.2527	2	12903	<.0001
Levene	288.7853	2	12903	<.0001
Bartlett	294.5648	2	?	<.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

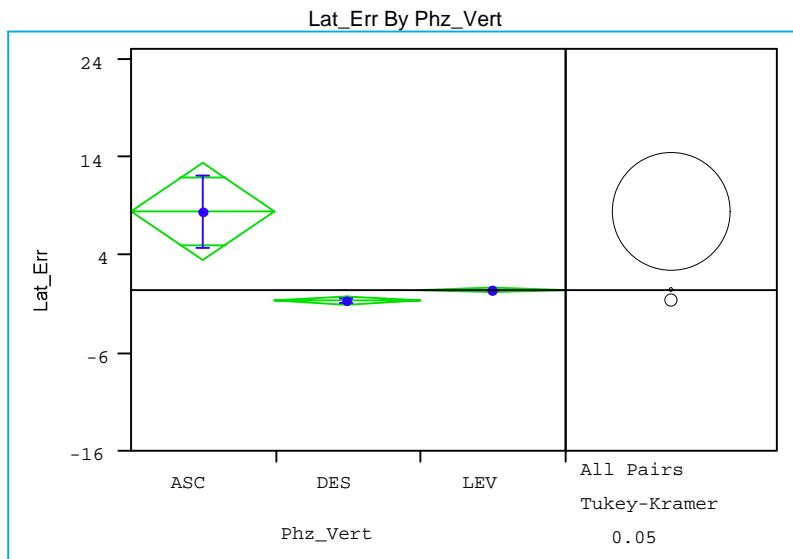
F Ratio	DF Num	DF Den	Prob>F
531.8025	2	248.43	<.0001

Figure A.2- 148 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at All Altitudes



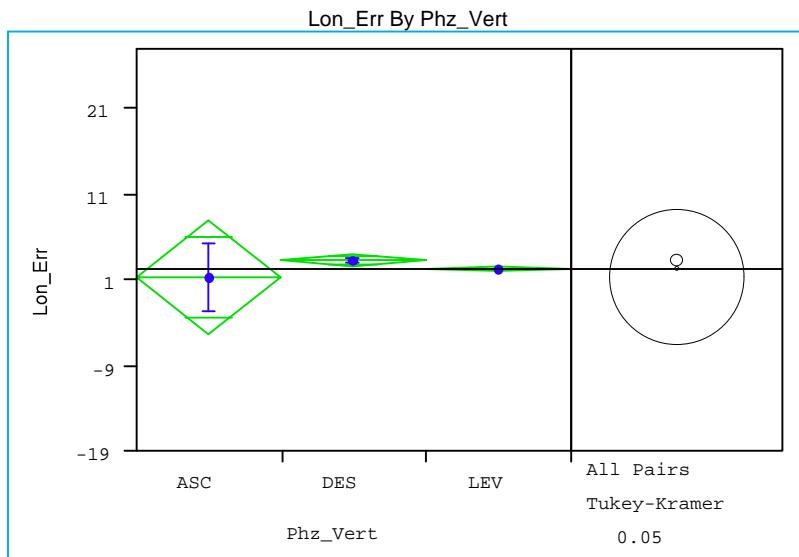
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	18.4117	10.8303	3.0038	
DES	899	10.0099	10.1100	0.3372	
LEV	5740	11.0734	11.3750	0.1501	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	7.33828	8.40179	
LEV		-7.33828	0.00000	1.06351	
DES		-8.40179	-1.06351	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34423$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-10.3087	0.0407	1.0599	
LEV		0.0407	-0.4906	0.1208	
DES		1.0599	0.1208	-1.2396	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	10.83032	7.995225	8.020500	
DES	899	10.10995	6.983412	6.383636	
LEV	5740	11.37495	8.383543	7.734759	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		2.0972	2	6649	0.1229
Brown-Forsythe		8.4349	2	6649	0.0002
Levene		13.0717	2	6649	<.0001
Bartlett		10.0616	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	7.1244	2	31.834	0.0028	

Figure A.2- 149 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



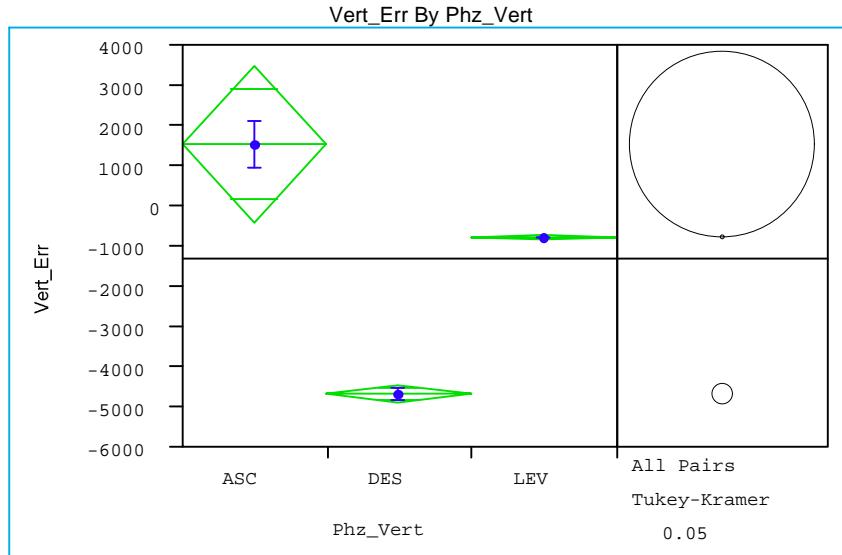
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	8.51086	13.9478	3.8684	
DES	899	-0.58525	7.8343	0.2613	
LEV	5740	0.59977	9.5891	0.1266	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	7.91109	9.09611	
LEV		-7.91109	0.00000	1.18501	
DES		-9.09611	-1.18501	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34423$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-8.62586	1.80479	2.95276	
LEV		1.80479	-0.41050	0.39620	
DES		2.95276	0.39620	-1.03728	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	13.94780	11.74387	11.76735	
DES	899	7.83429	4.67286	4.55423	
LEV	5740	9.58914	5.03219	4.90163	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		3.4555	2	6649	0.0316
Brown-Forsythe		5.5253	2	6649	0.0040
Levene		5.5092	2	6649	0.0041
Bartlett		30.8193	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	10.3232	2	31.774	0.0004	

Figure A.2- 150 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



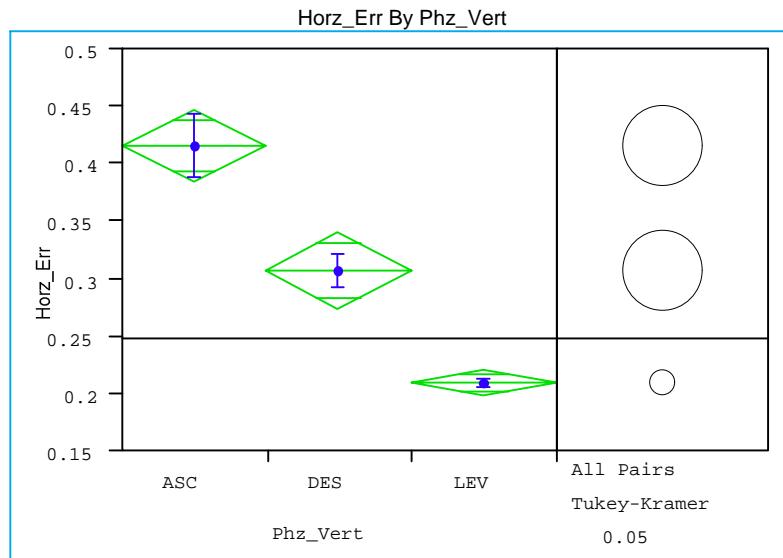
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	13	1.44341	14.4660	4.0122
DES	899	3.23863	11.4150	0.3807
LEV	5740	2.30849	12.4254	0.1640
Means Comparisons				
Dif=Mean[i]-Mean[j]		DES	LEV	ASC
DES		0.00000	0.93013	1.79522
LEV		-0.93013	0.00000	0.86509
ASC		-1.79522	-0.86509	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34423$			
Abs(Dif)-LSD		DES	LEV	ASC
DES		-1.3598	-0.1039	-6.2581
LEV		-0.1039	-0.5381	-7.1397
ASC		-6.2581	-7.1397	-11.3076
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	13	14.46603	11.37245	11.36032
DES	899	11.41499	7.49707	7.37398
LEV	5740	12.42540	8.27380	8.15128
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.5218	2	6649	0.2184
Brown-Forsythe	3.4678	2	6649	0.0312
Levene	3.5718	2	6649	0.0282
Bartlett	5.6347	2	?	0.0036
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	2.4966	2	31.785	0.0984

Figure A.2- 151 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



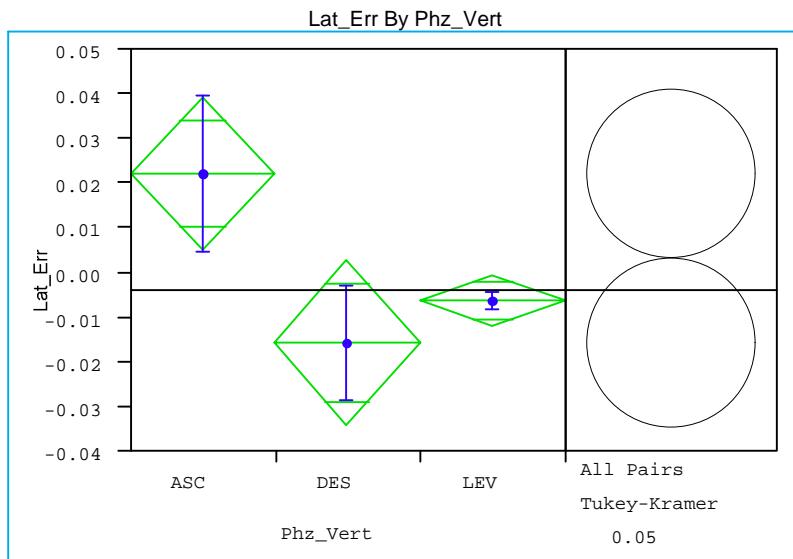
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	1569.38	2217.34	614.98	
DES	899	-4666.23	4881.61	162.81	
LEV	5740	-741.66	3393.31	44.79	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00	2311.05	6235.62	
LEV		-2311.05	0.00	3924.57	
DES		-6235.62	-3924.57	0.00	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34423$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-3336.33	-50.77	3859.48	
LEV		-50.77	-158.78	3619.47	
DES		3859.48	3619.47	-401.20	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	2217.340	1651.030	1617.077	
DES	899	4881.614	3663.617	3614.791	
LEV	5740	3393.309	2069.711	1699.630	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		38.2003	2	6649	<.0001
Brown-Forsythe		151.0714	2	6649	<.0001
Levene		129.4422	2	6649	<.0001
Bartlett		122.3683	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	273.1920	2	31.943	<.0001	

Figure A.2- 152 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at All Altitudes



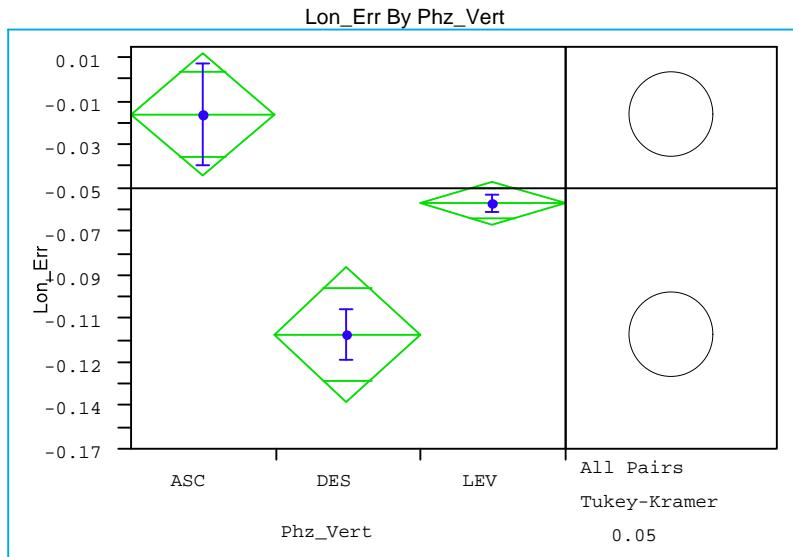
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
ASC	2202	0.422096	1.34263	0.02861	
DES	1812	0.306551	0.69023	0.01621	
LEV	17151	0.220674	0.64413	0.00492	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.000000	0.115545	0.201422	
DES		-0.11554	0.000000	0.085878	
LEV		-0.20142	-0.08588	0.000000	
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
		$q^* = 2.34387$			
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.05307	0.059689	0.161558	
DES		0.059689	-0.05851	0.042377	
LEV		0.161558	0.042377	-0.01902	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	2202	1.342634	0.4169606	0.3333033	
DES	1812	0.690227	0.2575815	0.2205308	
LEV	17151	0.644126	0.1764805	0.1506448	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		4.6705	2	21162	0.0094
Brown-Forsythe		63.2918	2	21162	<.0001
Levene		114.1045	2	21162	<.0001
Bartlett		1515.9052	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	35.2595	2	2973.9	<.0001	

Figure A.2- 153 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



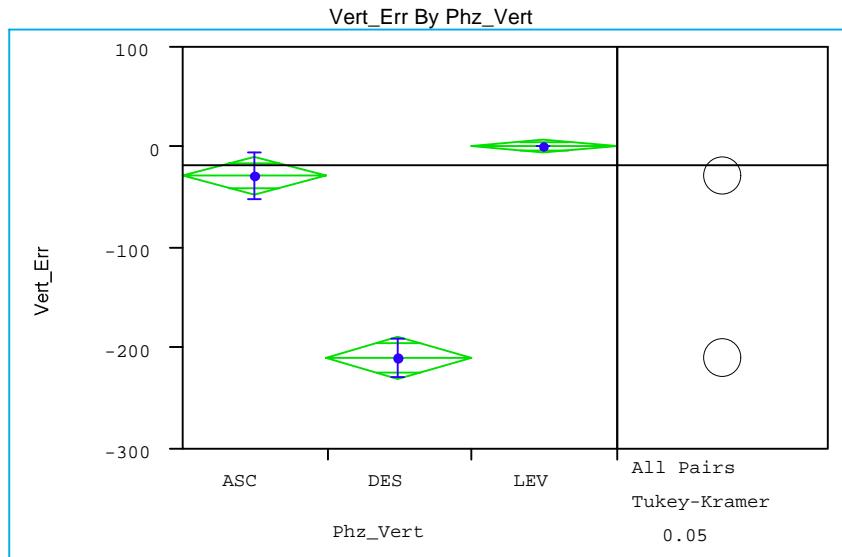
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	2202	0.024691	0.840207	0.01791	
DES	1812	-0.01042	0.548250	0.01288	
LEV	17151	-0.00357	0.294129	0.00225	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.000000	0.028265	0.035107	
LEV		-0.02826	0.000000	0.006843	
DES		-0.03511	-0.00684	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34387$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-0.02906	0.006436	0.004522	
LEV		0.006436	-0.01041	-0.01698	
DES		0.004522	-0.01698	-0.03204	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	2202	0.8402071	0.1928937	0.1879958	
DES	1812	0.5482501	0.1592899	0.1585052	
LEV	17151	0.2941291	0.0938289	0.0936644	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		16.2492	2	21162	<.0001
Brown-Forsythe		71.0257	2	21162	<.0001
Levene		76.9380	2	21162	<.0001
Bartlett		3662.7047	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	1.3815	2	2773.6	0.2514	

Figure A.2- 154 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



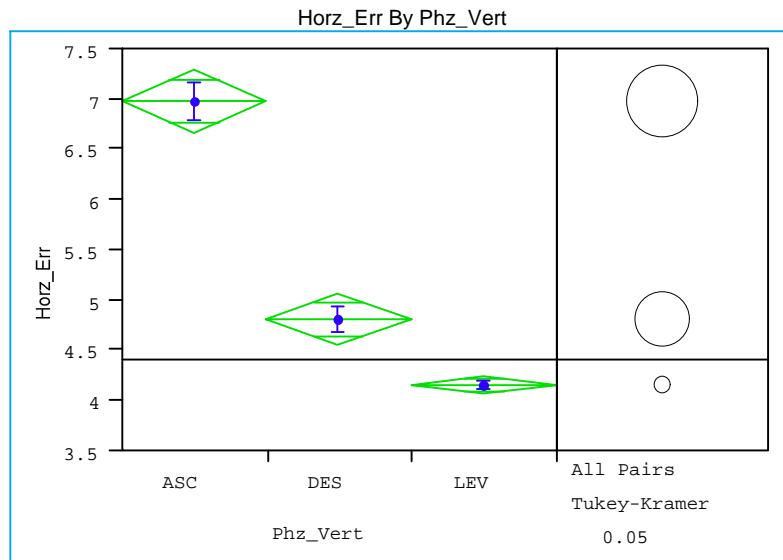
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	2202	-0.01037	1.12883	0.02406	
DES	1812	-0.09327	0.51093	0.01200	
LEV	17151	-0.04388	0.61249	0.00468	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.000000	0.033507	0.082895	
LEV		-0.03351	0.000000	0.049388	
DES		-0.08289	-0.04939	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34387$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-0.04785	-0.00244	0.032534	
LEV		-0.00244	-0.01715	0.010167	
DES		0.032534	0.010167	-0.05275	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	2202	1.128826	0.3302633	0.3275759	
DES	1812	0.510930	0.2119499	0.2104763	
LEV	17151	0.612493	0.1669001	0.1668973	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		2.4500	2	21162	0.0863
Brown-Forsythe		61.0119	2	21162	<.0001
Levene		63.2115	2	21162	<.0001
Bartlett		1114.5912	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	8.6873	2	3146	0.0002	

Figure A.2- 155 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



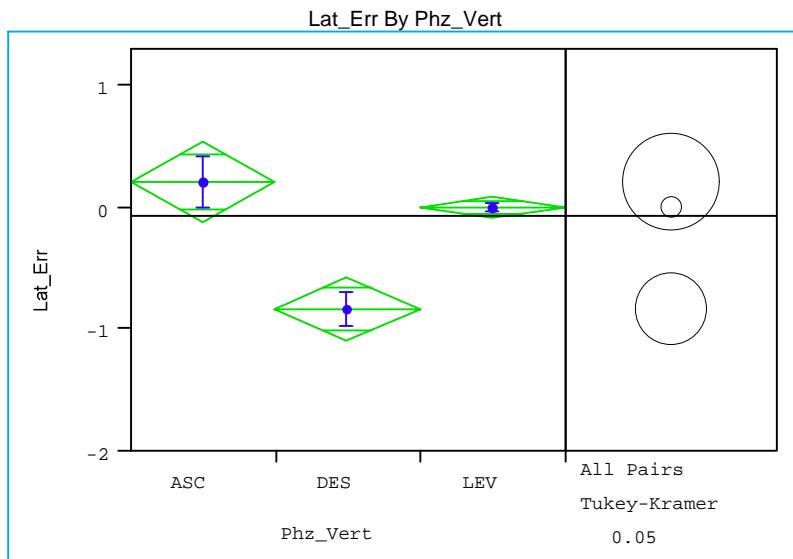
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	2202	-23.475	1123.64	23.945	
DES	1812	-202.305	833.07	19.570	
LEV	17151	2.754	263.21	2.010	
Means Comparisons					
Dif=Mean[i]-Mean[j]		LEV	ASC	DES	
LEV		0.000	26.229	205.059	
ASC		-26.229	0.000	178.830	
DES		-205.059	-178.830	0.000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34387$				
Abs(Dif)-LSD		LEV	ASC	DES	
LEV		-12.575	-0.132	176.293	
ASC		-0.132	-35.096	141.893	
DES		176.293	141.893	-38.689	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	2202	1123.636	254.6128	250.7931	
DES	1812	833.068	252.5226	227.5891	
LEV	17151	263.211	32.9780	30.8177	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		36.6913	2	21162	<.0001
Brown-Forsythe		303.4953	2	21162	<.0001
Levene		338.8610	2	21162	<.0001
Bartlett		8162.1553	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	54.8100	2	2696.6	<.0001	

Figure A.2- 156 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 0 for Samples at Altitudes Above 18,000 Feet



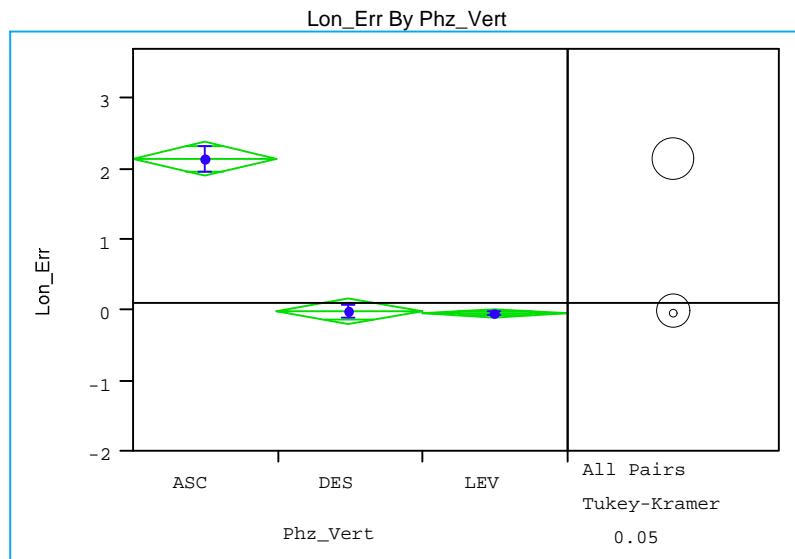
Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	945	6.98980	5.93362	0.19302
DES	1540	4.82235	5.21500	0.13289
LEV	12296	4.16374	5.02739	0.04534
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	DES	LEV
ASC		0.00000	2.16744	2.82605
DES		-2.16744	0.00000	0.65861
LEV		-2.82605	-0.65861	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
Abs(Dif)-LSD		ASC	DES	LEV
ASC		-0.55099	1.67253	2.42175
DES		1.67253	-0.43162	0.33486
LEV		2.42175	0.33486	-0.15275
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	945	5.933623	4.162648	3.996077
DES	1540	5.214998	3.500156	3.204339
LEV	12296	5.027388	3.389343	3.017383
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	4.4606	2	14778	0.0116
Brown-Forsythe	22.0580	2	14778	<.0001
Levene	18.6727	2	14778	<.0001
Bartlett	27.2158	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	108.1923	2	1788.8	<.0001

Figure A.2- 157 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



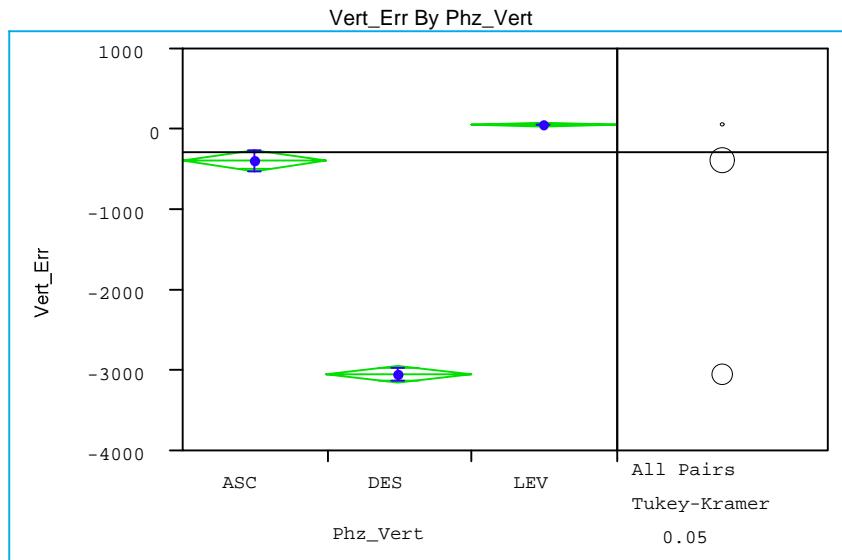
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	945	0.628674	6.83593	0.22237	
DES	1540	-0.41593	5.77308	0.14711	
LEV	12296	0.398568	5.17147	0.04664	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	0.23011	1.04460	
LEV		-0.23011	0.00000	0.81449	
DES		-1.04460	-0.81449	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34394$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-0.57774	-0.19383	0.525653	
LEV		-0.19383	-0.16017	0.475026	
DES		0.525653	0.475026	-0.45257	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	945	6.835927	3.704871	3.608629	
DES	1540	5.773082	3.412944	3.373358	
LEV	12296	5.171465	2.675225	2.574678	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		17.9586	2	14778	<.0001
Brown-Forsythe		38.9748	2	14778	<.0001
Levene		37.2465	2	14778	<.0001
Bartlett		90.4058	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	14.8229	2	1752.7	<.0001	

Figure A.2- 158 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



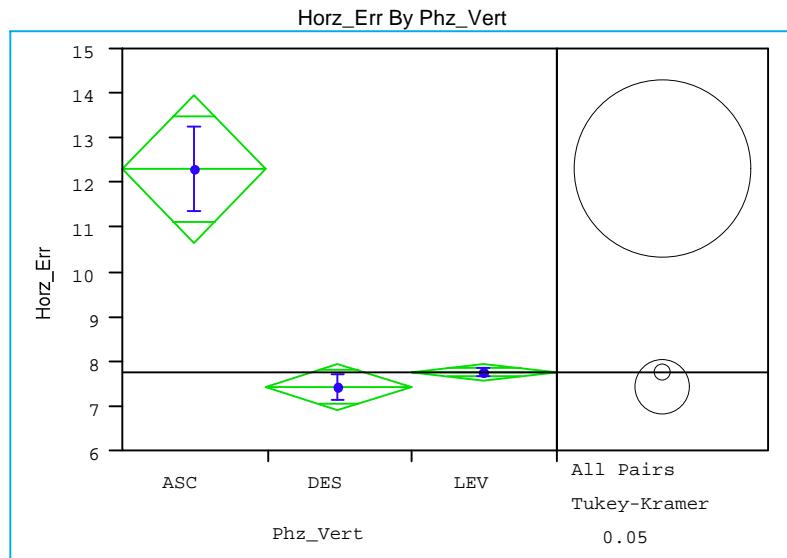
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	945	2.34529	5.61116	0.18253	
DES	1540	0.19763	4.11409	0.10484	
LEV	12296	0.17573	3.95967	0.03571	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.00000	2.14766	2.16956	
DES		-2.14766	0.00000	0.02190	
LEV		-2.16956	-0.02190	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34394$				
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-0.44222	1.75045	1.84507	
DES		1.75045	-0.34641	-0.23794	
LEV		1.84507	-0.23794	-0.12259	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	945	5.611159	4.188685	4.184091	
DES	1540	4.114089	2.545280	2.544765	
LEV	12296	3.959669	2.435704	2.433590	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		24.6430	2	14778	<.0001
Brown-Forsythe		133.0151	2	14778	<.0001
Levene		133.7116	2	14778	<.0001
Bartlett		130.4081	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	68.1467	2	1757.4	<.0001	

Figure A.2- 159 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



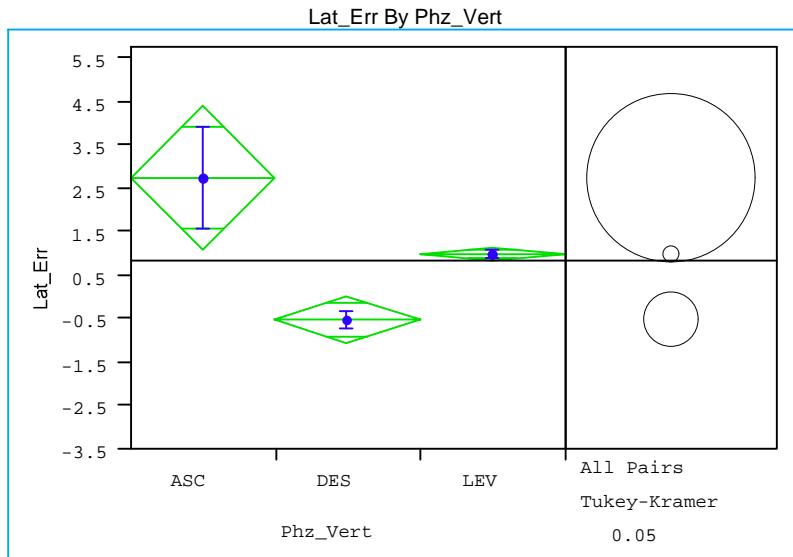
Level	Means and Std Deviations			
	Number	Mean	Std Dev	Std Err Mean
ASC	945	-380.28	4319.61	140.52
DES	1540	-3032.69	3379.09	86.11
LEV	12296	65.83	2043.03	18.42
Means Comparisons				
Dif=Mean[i]-Mean[j]	LEV	ASC	DES	
LEV	0.00	446.11	3098.52	
ASC	-446.11	0.00	2652.41	
DES	-3098.52	-2652.41	0.00	
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34394$			
Abs(Dif)-LSD	LEV	ASC	DES	
LEV	-72.33	254.67	2945.23	
ASC	254.67	-260.89	2418.07	
DES	2945.23	2418.07	-204.37	
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	945	4319.607	3002.328	2940.678
DES	1540	3379.094	2559.165	2542.165
LEV	12296	2043.027	779.610	737.421
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	186.7679	2	14778	<.0001
Brown-Forsythe	948.1531	2	14778	0.0000
Levene	973.3493	2	14778	0.0000
Bartlett	1017.5161	2	?	0.0000
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	621.2446	2	1645.5	<.0001

Figure A.2- 160 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 600 for Samples at Altitudes Above 18,000 Feet



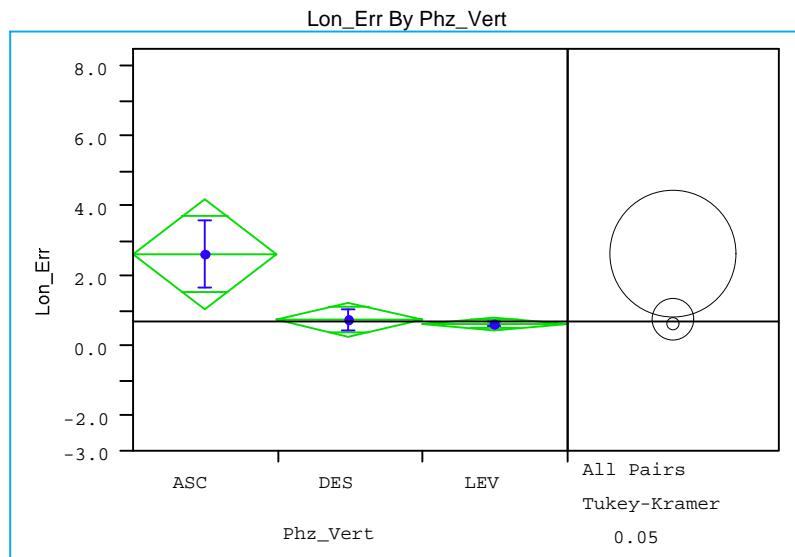
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	95	12.3169	9.55293	0.98011	
DES	856	7.4245	8.55565	0.29243	
LEV	7223	7.7775	8.38689	0.09868	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	4.53939	4.89236	
LEV		-4.53939	0.00000	0.35297	
DES		-4.89236	-0.35297	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34413$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-2.86349	2.50132	2.75817	
LEV		2.50132	-0.32840	-0.36042	
DES		2.75817	-0.36042	-0.95394	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	95	9.552931	7.586070	7.334192	
DES	856	8.555648	5.319627	4.889017	
LEV	7223	8.386888	6.017697	5.509816	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		0.4071	2	8171	0.6656
Brown-Forsythe		6.3817	2	8171	0.0017
Levene		8.8861	2	8171	0.0001
Bartlett		1.9610	2	?	0.1407
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	11.4198	2	234.05	<.0001	

Figure A.2- 161 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	95	2.78727	11.6949	1.1999
DES	856	-0.51335	6.5813	0.2249
LEV	7223	1.00169	8.3609	0.0984
Means Comparisons				
Dif=Mean[i]-Mean[j]		ASC	LEV	DES
ASC		0.00000	1.78558	3.30063
LEV		-1.78558	0.00000	1.51504
DES		-3.30063	-1.51504	0.00000
Alpha=	0.05			
Comparisons for all pairs using Tukey-Kramer HSD				
	$q^* = 2.34413$			
Abs(Dif)-LSD		ASC	LEV	DES
ASC		-2.80247	-0.20905	1.21191
LEV		-0.20905	-0.32140	0.81686
DES		1.21191	0.81686	-0.93361
Positive values show pairs of means that are significantly different.				
Tests that the Variances are Equal				
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	95	11.69487	7.620599	6.765580
DES	856	6.58134	3.961623	3.888615
LEV	7223	8.36086	4.579453	4.285086
Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	8.2021	2	8171	0.0003
Brown-Forsythe	7.1040	2	8171	0.0008
Levene	12.7391	2	8171	<.0001
Bartlett	53.5887	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	20.4032	2	234.97	<.0001

Figure A.2- 162 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations				
Level	Number	Mean	Std Dev	Std Err Mean
ASC	95	2.71589	9.61780	0.98677
DES	856	0.81066	9.17341	0.31354
LEV	7223	0.67125	7.71231	0.09075

Means Comparisons			
Dif=Mean[i]-Mean[j]	ASC	DES	LEV
ASC	0.00000	1.90524	2.04465
DES	-1.90524	0.00000	0.13941
LEV	-2.04465	-0.13941	0.00000

Alpha=	0.05
Comparisons for all pairs using Tukey-Kramer HSD	
$q^* = 2.34413$	
Abs(Dif)-LSD	
ASC	-2.68763
DES	-0.09789
LEV	0.13175
ASC	-0.09789
DES	-0.89535
LEV	-0.53017
ASC	0.13175
DES	-0.53017
LEV	-0.30823

Positive values show pairs of means that are significantly different.

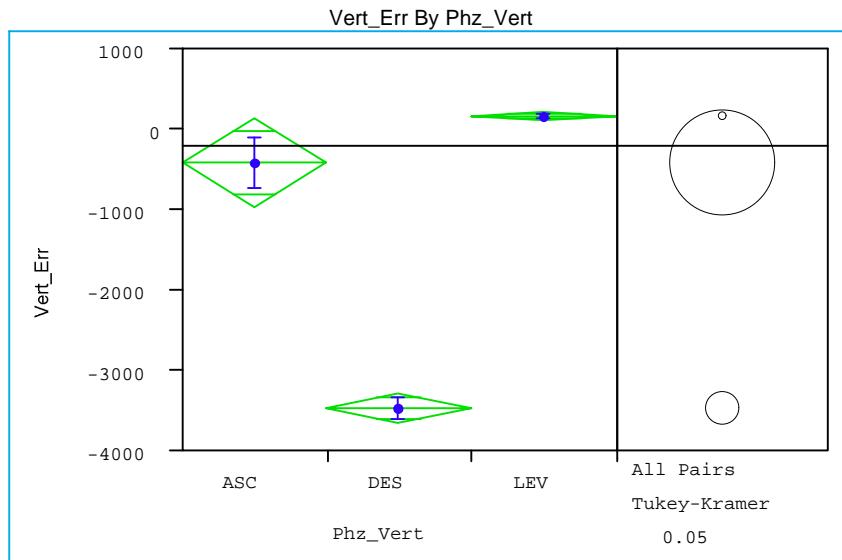
Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
ASC	95	9.617799	7.612791	7.605600
DES	856	9.173409	5.150617	5.127945
LEV	7223	7.712305	5.014171	5.002155

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	6.3232	2	8171	0.0018
Brown-Forsythe	8.6664	2	8171	0.0002
Levene	8.7217	2	8171	0.0002
Bartlett	29.3676	2	?	<.0001

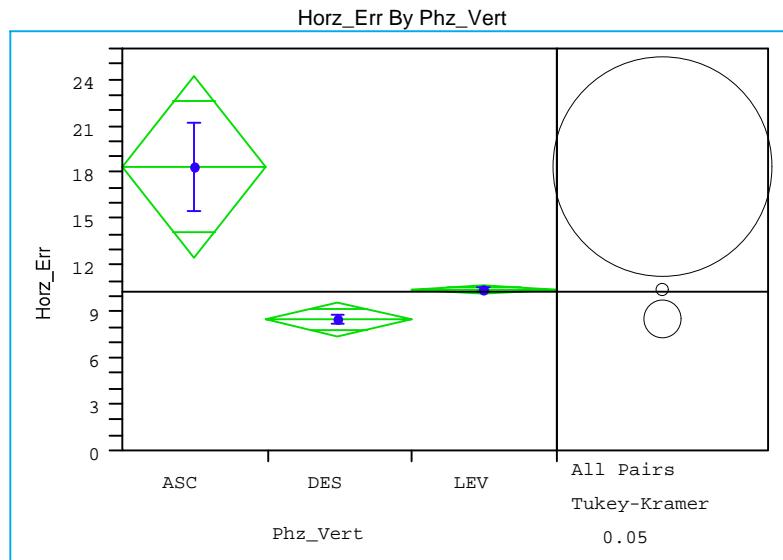
Welch Anova testing Means Equal, allowing Std's Not Equal				
	F Ratio	DF Num	DF Den	Prob>F
	2.1926	2	232.44	0.1139

Figure A.2- 163 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



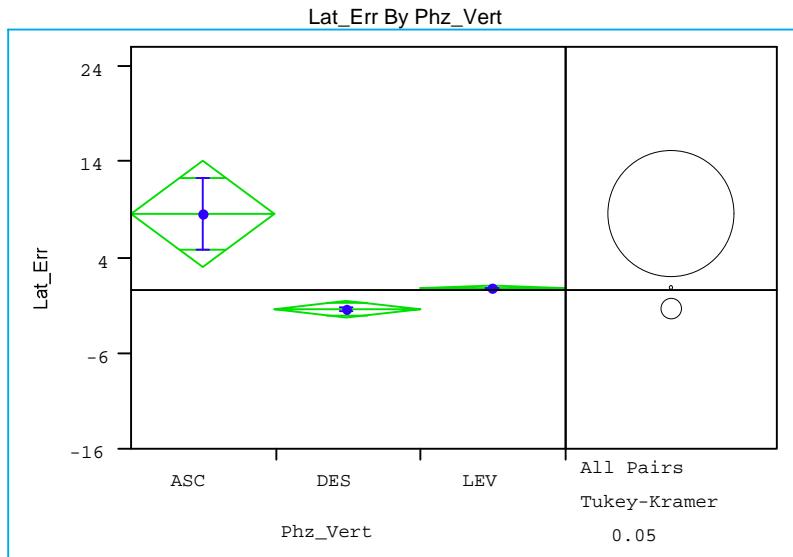
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
ASC	95	-408.74	3331.19	341.77	
DES	856	-3460.70	4468.07	152.72	
LEV	7223	187.36	2589.29	30.47	
Means Comparisons					
Dif=Mean[i]-Mean[j]		LEV	ASC	DES	
LEV		0.00	596.09	3648.06	
ASC		-596.09	0.00	3051.96	
DES		-3648.06	-3051.96	0.00	
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
Abs(Dif)-LSD		LEV	ASC	DES	
LEV		-111.30	-94.68	3406.27	
ASC		-94.68	-970.53	2328.61	
DES		3406.27	2328.61	-323.32	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
ASC	95	3331.191		2442.988	2422.905
DES	856	4468.066		3173.108	3159.027
LEV	7223	2589.291		1099.377	974.838
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	48.6677	2	8171	<.0001	
Brown-Forsythe	303.9437	2	8171	<.0001	
Levene	286.5383	2	8171	<.0001	
Bartlett	303.1262	2	?	<.0001	
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	274.4881	2	230.68	<.0001	

Figure A.2- 164 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1200 for Samples at Altitudes Above 18,000 Feet



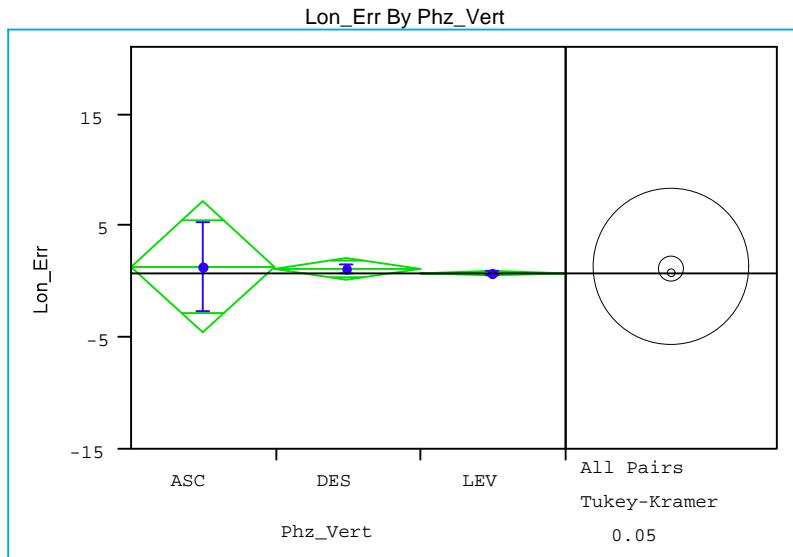
Level	Number	Means and Std Deviations			
		Mean	Std Dev	Std Err Mean	
ASC	13	18.4117	10.8303	3.0038	
DES	392	8.5610	7.7092	0.3894	
LEV	3507	10.5180	11.3798	0.1922	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	7.89373	9.85070	
LEV		-7.89373	0.00000	1.95697	
DES		-9.85070	-1.95697	0.00000	
Alpha=		0.05			
Comparisons for all pairs using Tukey-Kramer HSD					
Abs(Dif)-LSD		q* = 2.34460			
ASC		ASC	LEV	DES	
LEV		-10.1765	0.6846	2.5365	
DES		0.6846	-0.6196	0.5753	
		2.5365	0.5753	-1.8532	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean		MeanAbsDif to Median
ASC	13	10.83032		7.995225	8.020500
DES	392	7.70925		5.455350	5.193106
LEV	3507	11.37979		8.106691	7.402555
Test	F Ratio	DF Num	DF Den	Prob>F	
O'Brien[.5]	6.1623	2	3909	0.0021	
Brown-Forsythe	10.1909	2	3909	<.0001	
Levene	20.5557	2	3909	<.0001	
Bartlett	42.8970	2	?	<.0001	
Welch Anova testing Means Equal, allowing Std's Not Equal					
F Ratio	DF Num	DF Den	Prob>F		
13.6521	2	31.575	<.0001		

Figure A.2- 165 Statistical Tests for Horizontal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



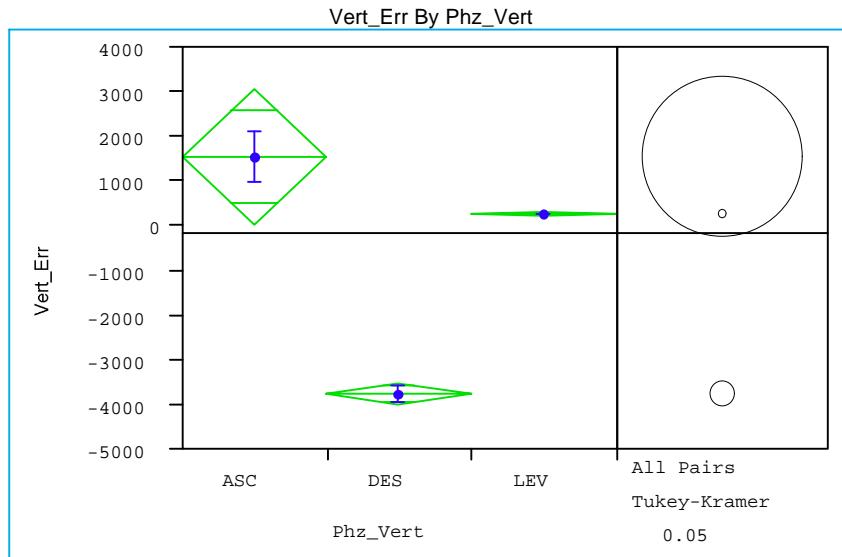
Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	8.51086	13.9478	3.8684	
DES	392	-1.33389	8.2139	0.4149	
LEV	3507	0.90741	10.4962	0.1772	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00000	7.60345	9.84475	
LEV		-7.60345	0.00000	2.24130	
DES		-9.84475	-2.24130	0.00000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34460$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-9.47522	0.89105	3.03457	
LEV		0.89105	-0.57689	0.95480	
DES		3.03457	0.95480	-1.72551	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	13.94780	11.74387	11.76735	
DES	392	8.21390	5.21613	4.93337	
LEV	3507	10.49624	5.51236	5.25194	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		2.0601	2	3909	0.1276
Brown-Forsythe		3.7195	2	3909	0.0243
Levene		3.5589	2	3909	0.0286
Bartlett		19.6651	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	14.1484	2	31.419	<.0001	

Figure A.2- 166 Statistical Tests for Lateral Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	1.44341	14.4660	4.0122	
DES	392	1.22113	7.8844	0.3982	
LEV	3507	0.79997	11.3369	0.1914	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	DES	LEV	
ASC		0.000000	0.222276	0.643442	
DES		-0.22228	0.000000	0.421166	
LEV		-0.64344	-0.42117	0.000000	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34460$				
Abs(Dif)-LSD		ASC	DES	LEV	
ASC		-10.1632	-7.0824	-6.5563	
DES		-7.0824	-1.8508	-0.9588	
LEV		-6.5563	-0.9588	-0.6188	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	14.46603	11.37245	11.36032	
DES	392	7.88442	5.56505	5.56489	
LEV	3507	11.33686	7.22808	7.19496	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		6.6445	2	3909	0.0013
Brown-Forsythe		8.1257	2	3909	0.0003
Levene		8.4767	2	3909	0.0002
Bartlett		38.8478	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	0.4545	2	31.474	0.6388	

Figure A.2- 167 Statistical Tests for Longitudinal Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet



Means and Std Deviations					
Level	Number	Mean	Std Dev	Std Err Mean	
ASC	13	1569.38	2217.34	614.98	
DES	392	-3744.79	4239.04	214.10	
LEV	3507	268.79	2607.02	44.02	
Means Comparisons					
Dif=Mean[i]-Mean[j]		ASC	LEV	DES	
ASC		0.00	1300.60	5314.18	
LEV		-1300.60	0.00	4013.58	
DES		-5314.18	-4013.58	0.00	
Alpha=	0.05				
Comparisons for all pairs using Tukey-Kramer HSD					
	$q^* = 2.34460$				
Abs(Dif)-LSD		ASC	LEV	DES	
ASC		-2586.15	-531.48	3455.41	
LEV		-531.48	-157.46	3662.44	
DES		3455.41	3662.44	-470.96	
Positive values show pairs of means that are significantly different.					
Tests that the Variances are Equal					
Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median	
ASC	13	2217.340	1651.030	1617.077	
DES	392	4239.042	3332.325	3316.254	
LEV	3507	2607.018	1183.840	1011.159	
Test		F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]		21.7994	2	3909	<.0001
Brown-Forsythe		156.9285	2	3909	<.0001
Levene		147.2733	2	3909	<.0001
Bartlett		106.4583	2	?	<.0001
Welch Anova testing Means Equal, allowing Std's Not Equal					
	F Ratio	DF Num	DF Den	Prob>F	
	167.8343	2	31.418	<.0001	

Figure A.2- 168 Statistical Tests for Vertical Error and Vertical Phase of Flight at Look Ahead Time 1800 for Samples at Altitudes Above 18,000 Feet

Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/ Center-TRACON Automation System (CTAS)

APPENDIX B: Listing of Standard Deviation Plots

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May 1999

DOT/FAA/CT-TN99/10

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APPENDIX B

B.0 Introduction

Appendix B is a supplement to *Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/Center-TRACON Automation System (CTAS), DOT/FAA/CT-TN99/10*. The Appendix B contains a super set list of Microsoft PowerPoint slides from the Enroute Area Work Team (ERAWT) quarterly meeting held April 20-21 at MITRE, where the preliminary analysis of this report was presented.

The PowerPoint slides provide the standard deviation (STD) for horizontal, lateral, longitudinal and vertical error by look ahead time for the flight categories analyzed in the report – flight type, horizontal and vertical error. Additional slides from the presentation that duplicate information provided earlier in this report have been excluded.

The remaining portions of this introduction to Appendix B summarize the slide sequence and provide a brief description of the slides and method used to calculate the STD statistics.

B.0.1. Appendix Layout

Appendix B presents the standard deviations as a function of look ahead time and in order of the particular trajectory modeler and three factor categories. These categories are listed in the PowerPoint slide headings, including flight type, horizontal and vertical phase of flight. Table B.0-1 summarizes the slide sequence. Appendix Section B.1 contains slides pertaining to the URET trajectory modeler and Appendix B.2 provides slides for the CTAS modeler.

Table B.0- 1: Standard Deviation Slides by Trajectory Modeler

B.1 URET	B.2 CTAS
<i>B.1.1 Flight Type</i>	<i>B.2.1 Flight Type</i>
<i>Flight Type – All Altitudes</i>	<i>Flight Type – All Altitudes</i>
Horizontal Error	Horizontal Error
Lateral Error	Lateral Error
Longitudinal Error	Longitudinal Error
Vertical Error	Vertical Error
<i>Flight Type – Above 18,000 Feet</i>	<i>Flight Type – Above 18,000 Feet</i>
Horizontal Error	Horizontal Error
Lateral Error	Lateral Error
Longitudinal Error	Longitudinal Error
Vertical Error	Vertical Error
<i>B.1.2 Horizontal Phase of Flight</i>	<i>B.2.2 Horizontal Phase of Flight</i>
Same sequence	Same sequence
<i>B.1.3 Vertical Phase of Flight</i>	<i>B.2.3 Vertical Phase of Flight</i>
Same sequence	Same sequence

B.0.2. Description of PowerPoint Slides for STD

Figure B.0-1 is an example a PowerPoint slide for the standard deviation (STD) of the horizontal error for the flight type factor. The category along the horizontal axis for all STD slides is look ahead time. Look ahead time is shown in 600 second increments from 0 to 1800 seconds. The units along the vertical axis (not shown) are nautical miles for slides with horizontal, lateral, and longitudinal error and feet for slides with vertical error.

Comparable to the charts plotted for mean error in the body of the report in Sections 3.3 and 4.3, the following factors were plotted to evaluate standard deviation: overflights, arrivals, departures, and internal flights (i.e. OVR, ARR, DEP, and INR, respectively) for the flight type category, turn and straight for horizontal phase of flight (i.e. TRN and STR, respectively), and ascent, descent, and level flight for the vertical phase of flight (i.e. ASC, DES, and LEV, respectively).

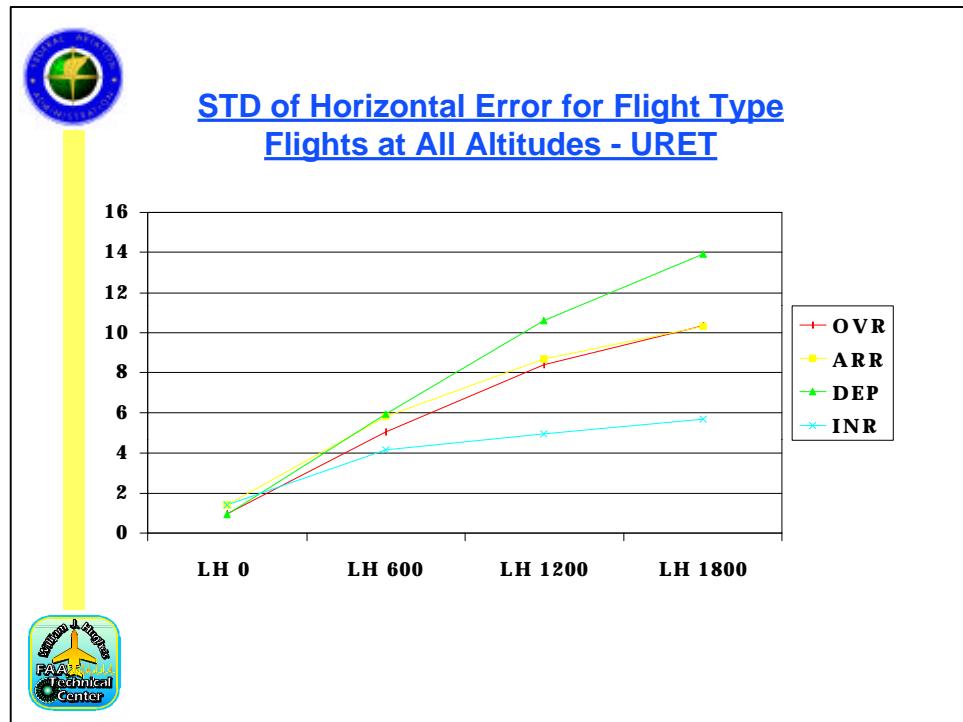


Figure B:0-1 Example of PowerPoint Slide for Standard Deviation

B.0.3. Definition of Standard Deviation

Standard deviation (STD) measures the spread of a distribution of observations about the mean. The sample standard deviation is calculated as the square root of the variance,

$$s^2 = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}} \quad \text{Equation B.0-1}$$

where

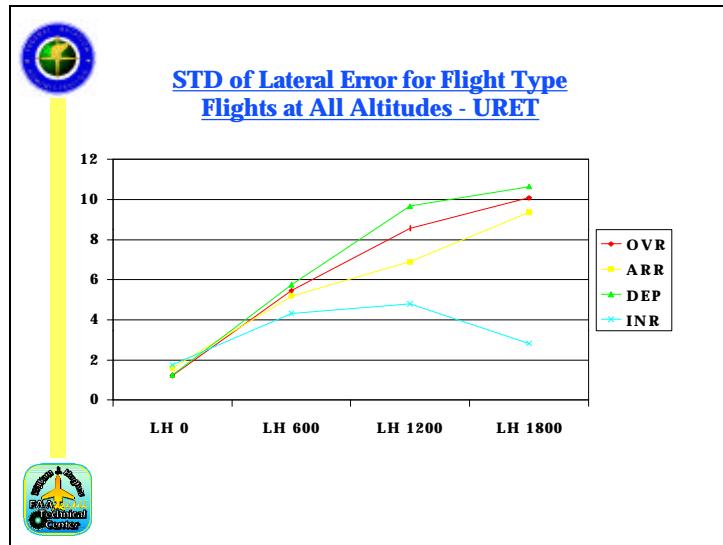
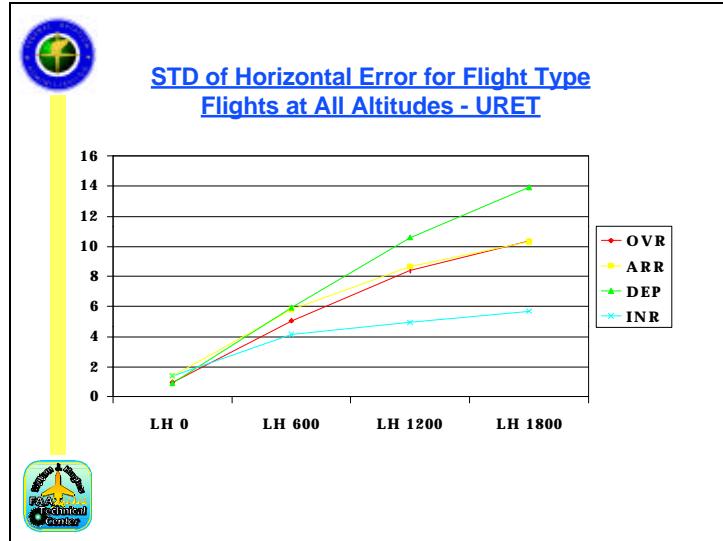
x_i is a data point

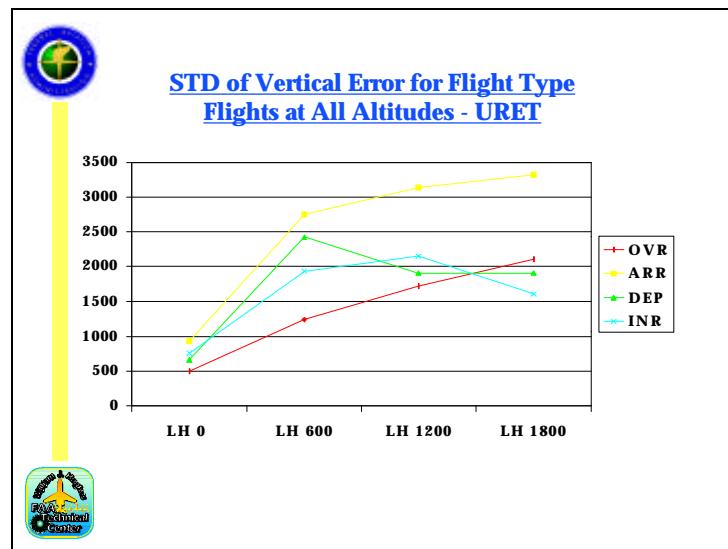
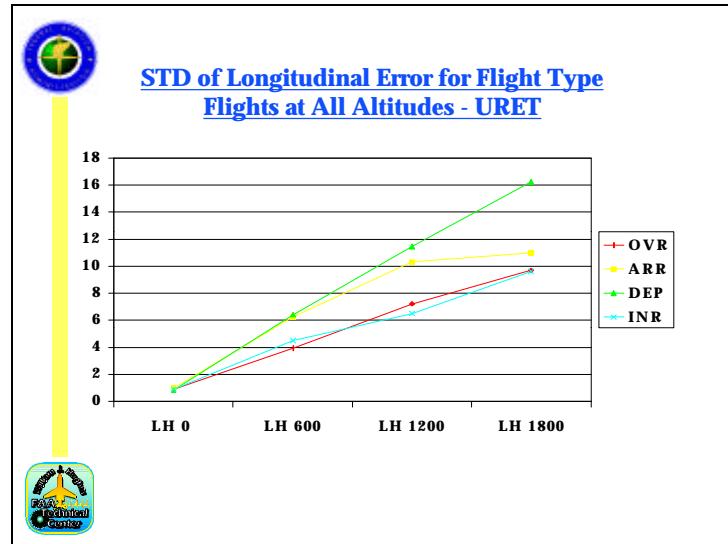
\bar{x} is the sample mean

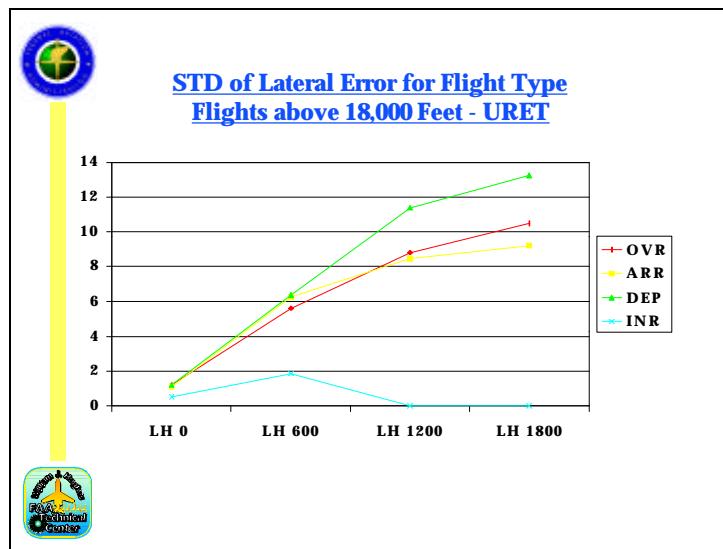
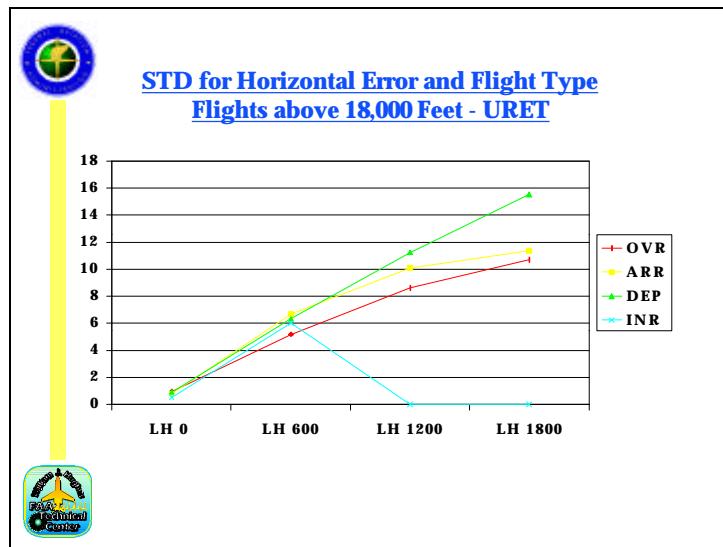
n is the sample size

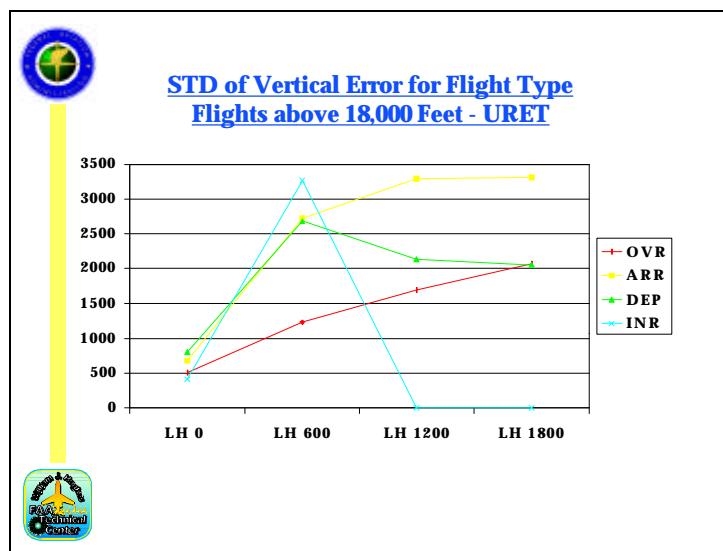
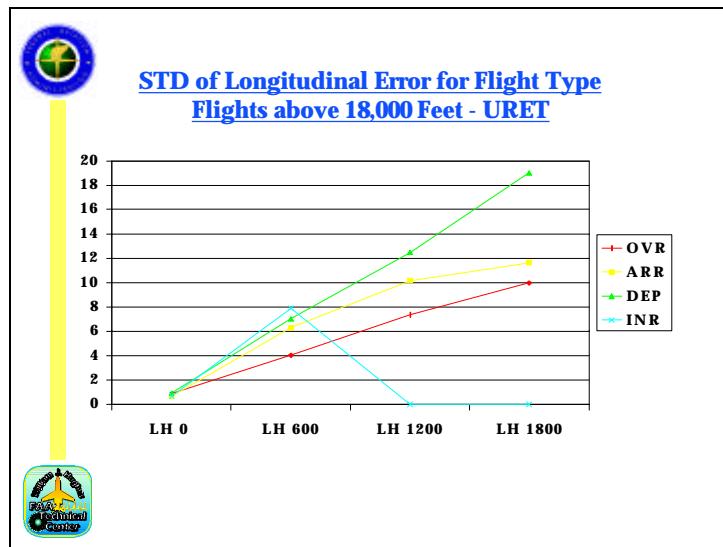
B.1 URET PowerPoint Slides for Standard Deviation

B.1.1 Flight Type

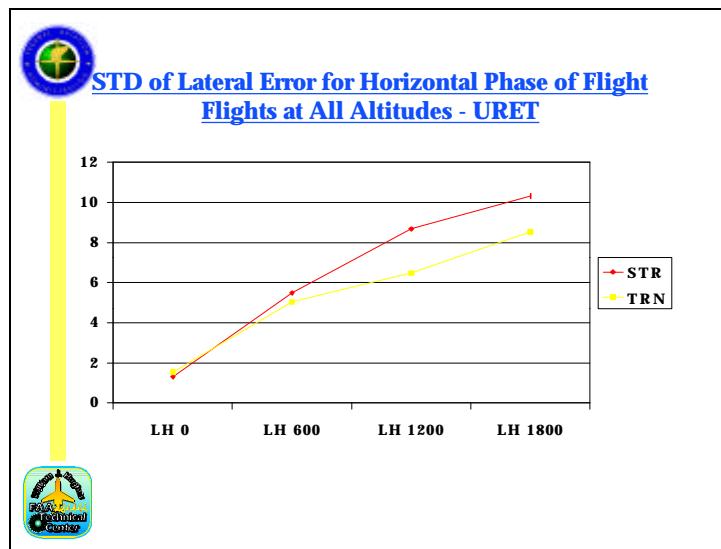
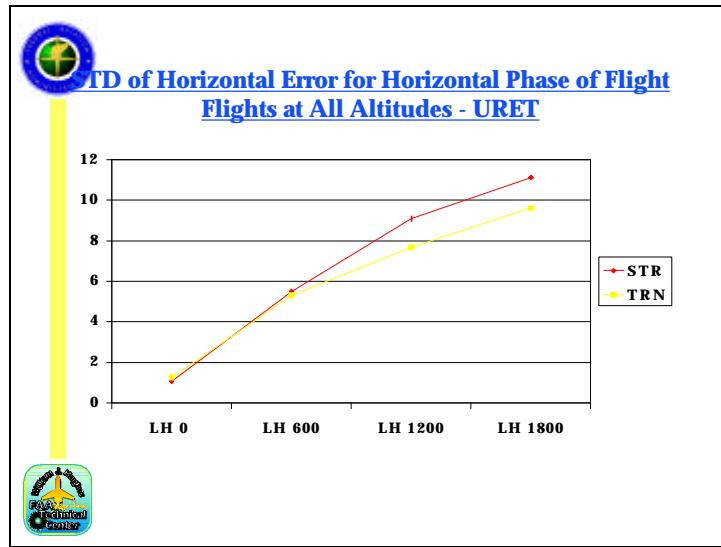


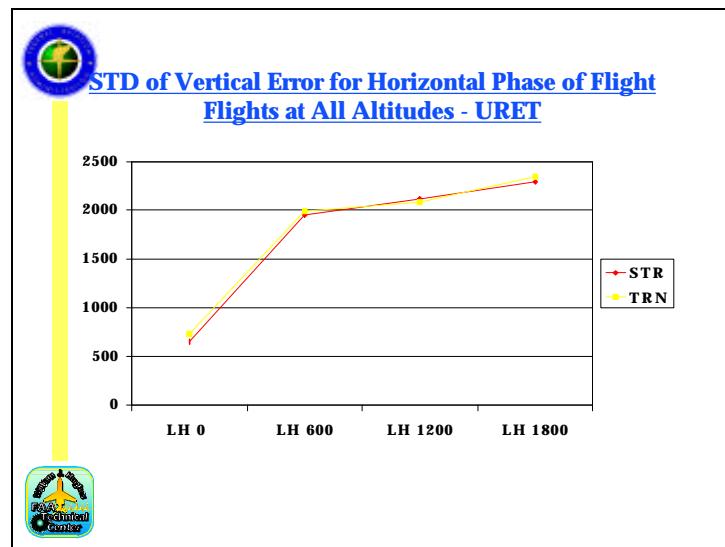
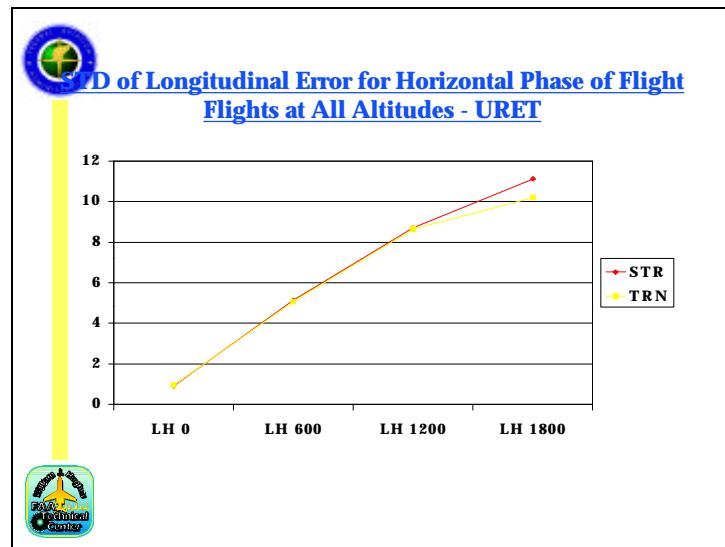


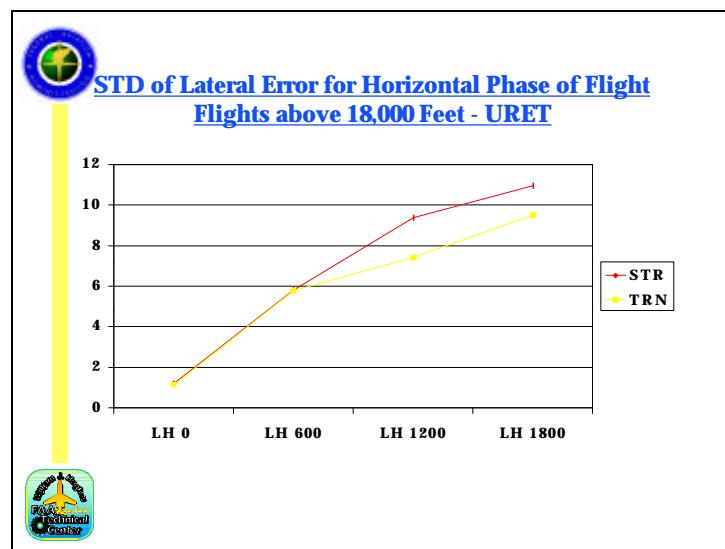
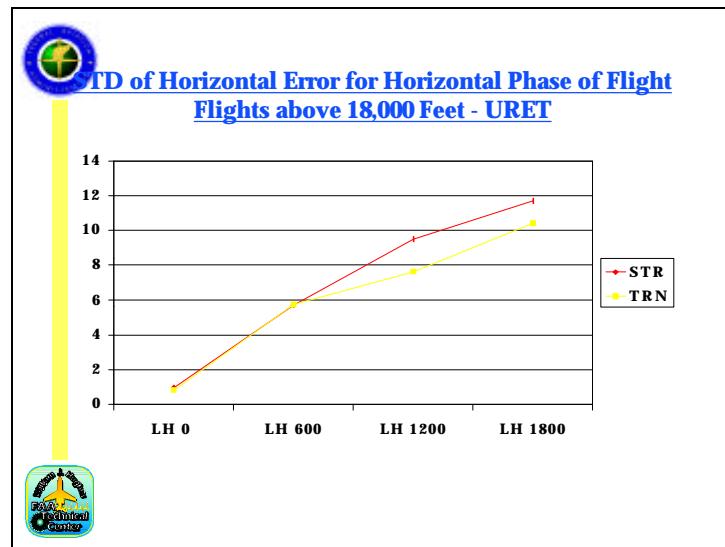


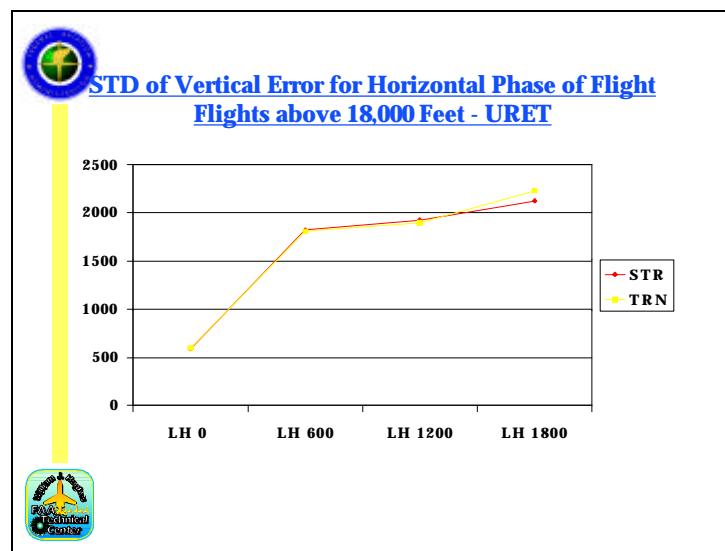
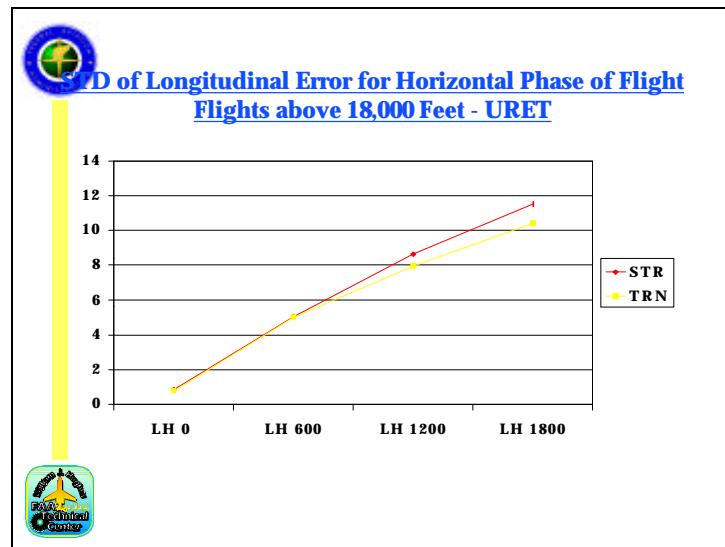


B.1.2 Horizontal Phase of Flight

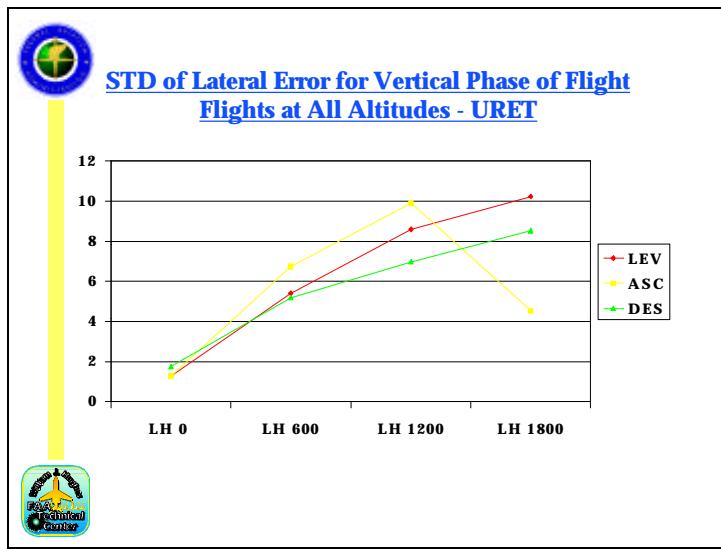
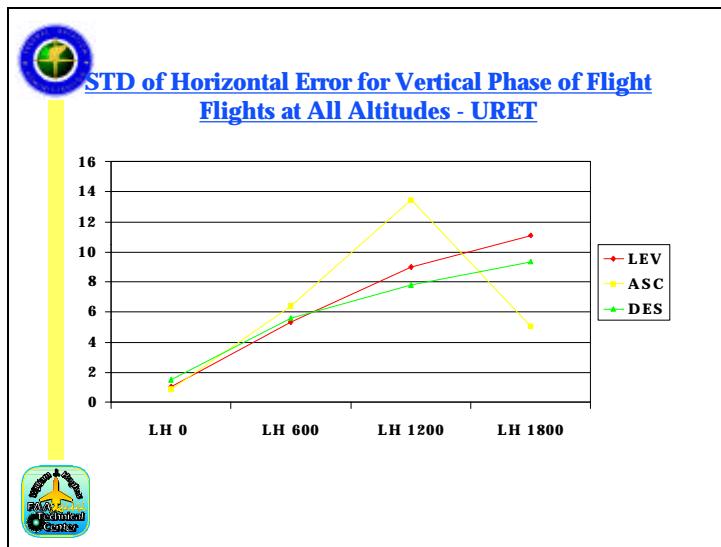


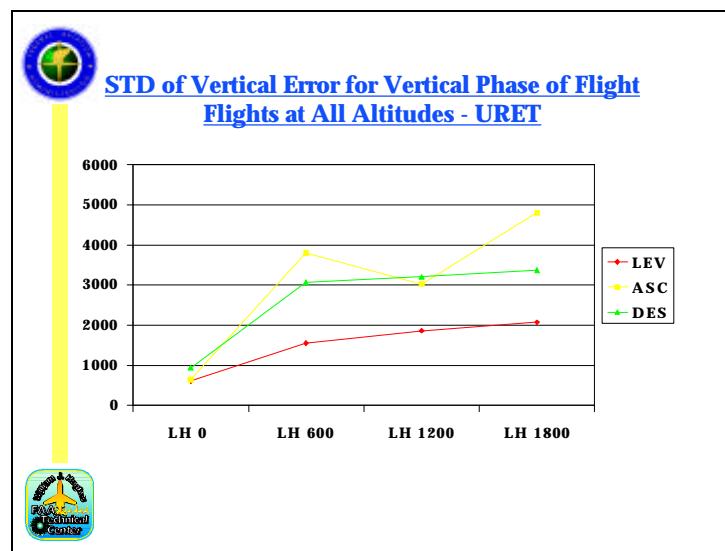
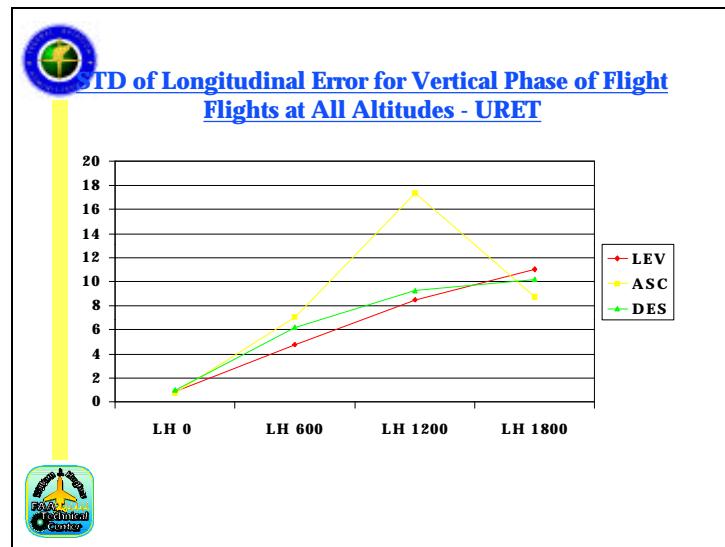


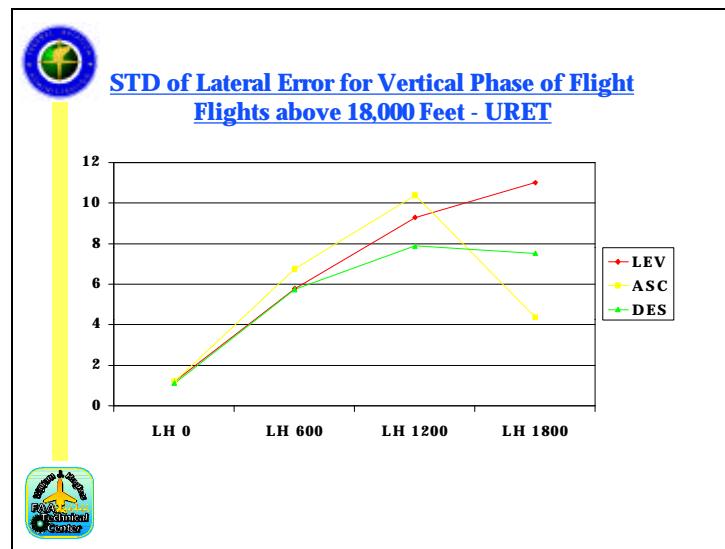
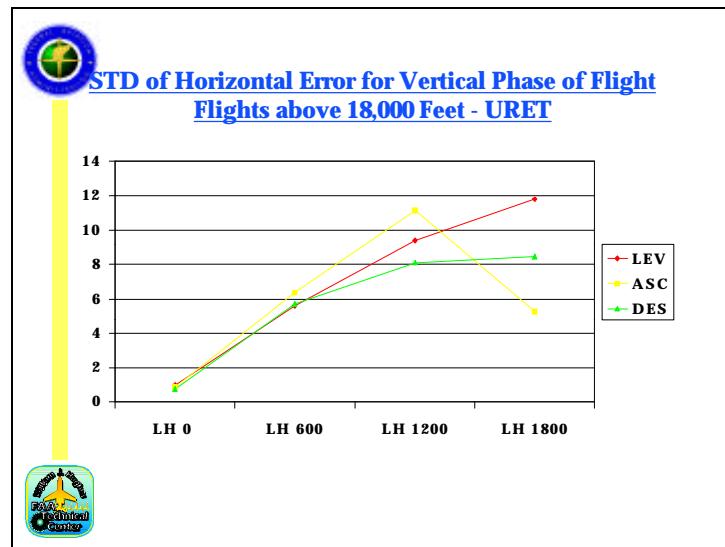


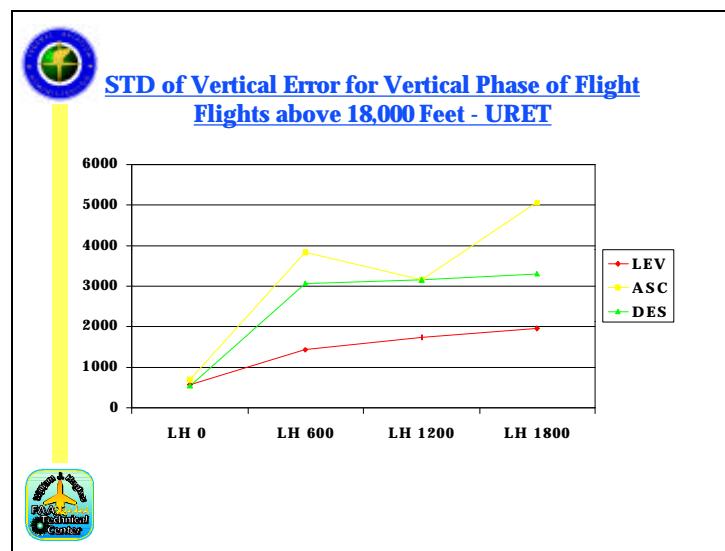
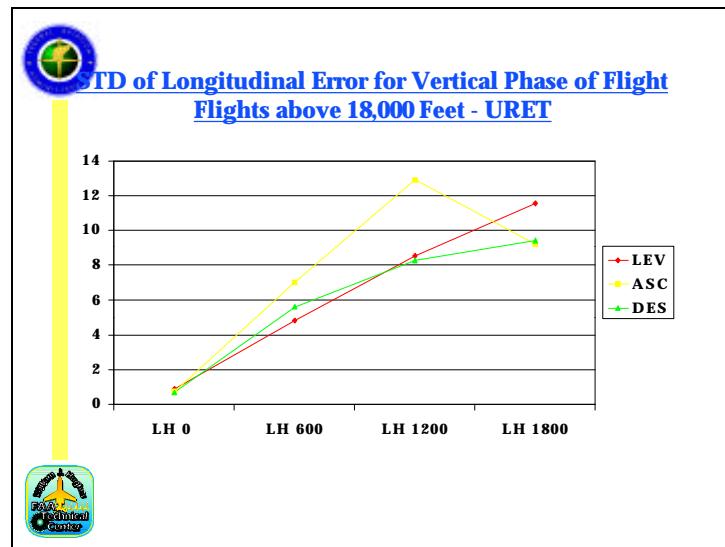


B.1.3 Vertical Phase of Flight



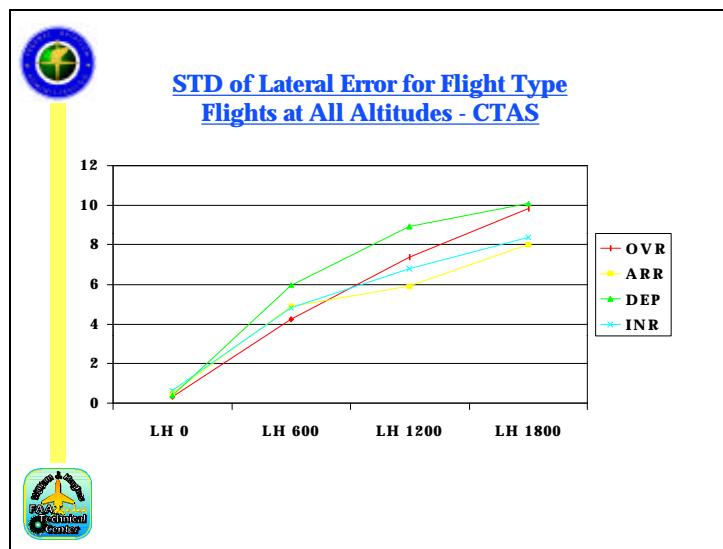
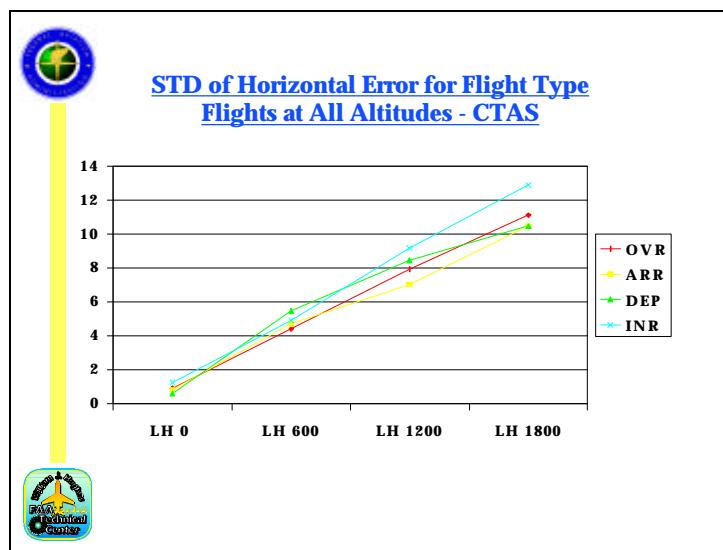


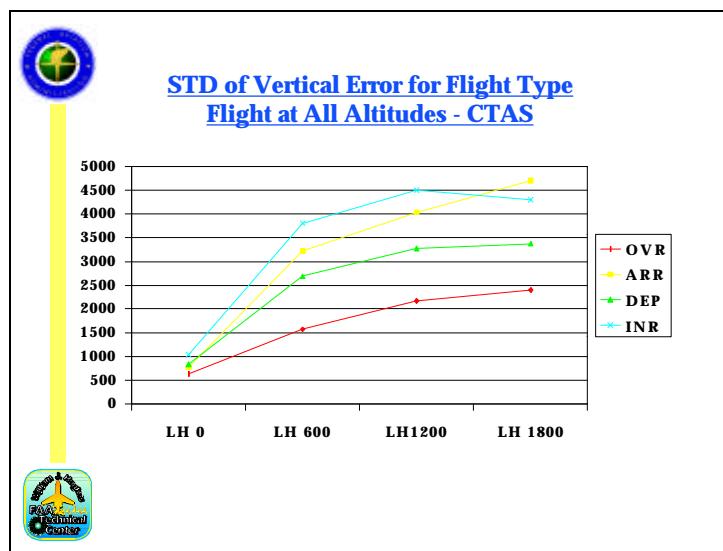
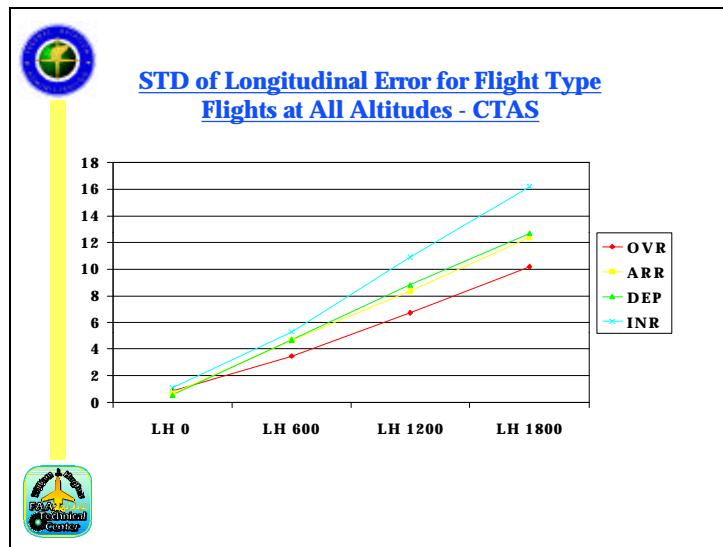


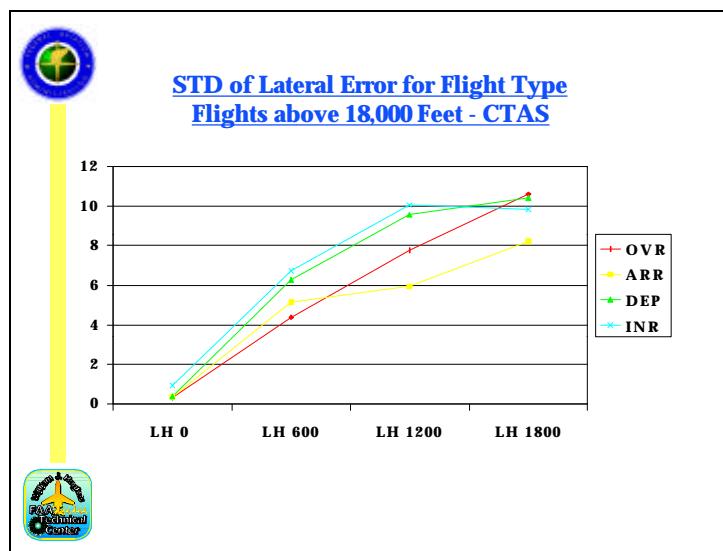
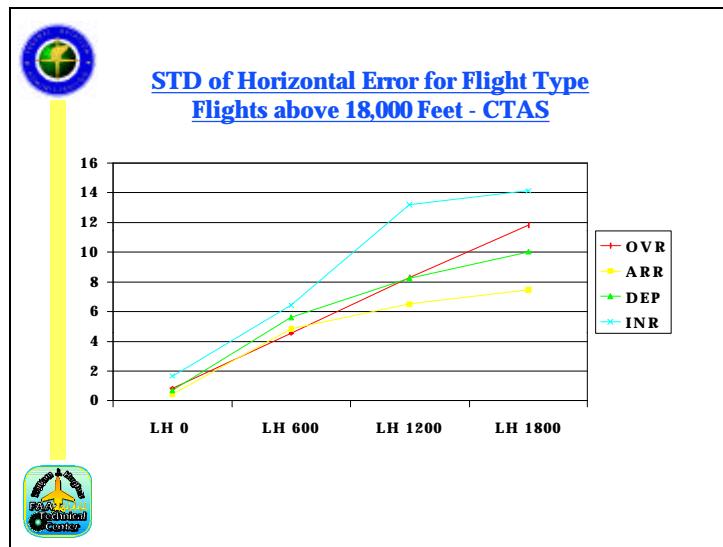


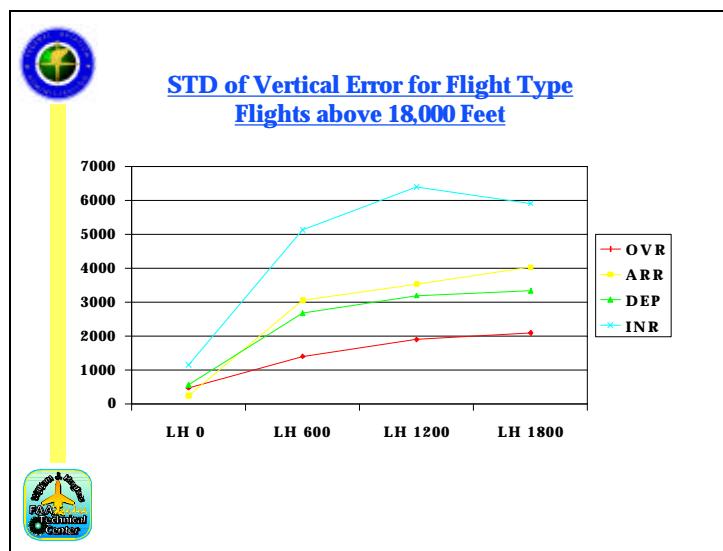
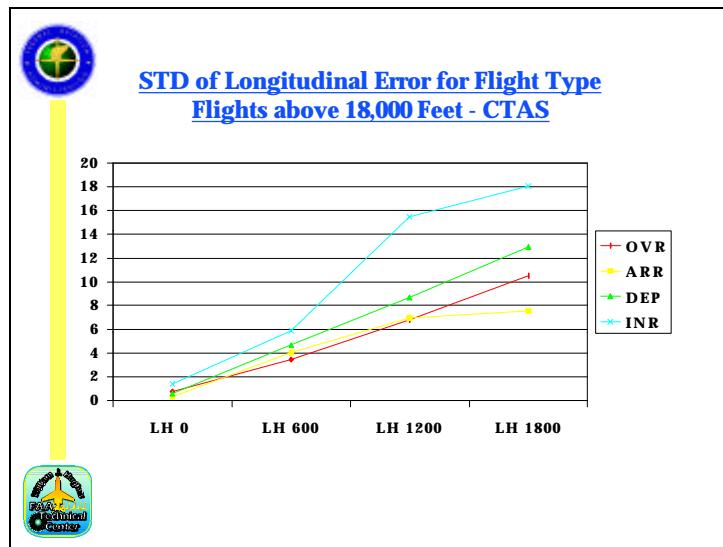
B.2 CTAS PowerPoint Slides for Standard Deviation

B.2.1. Flight Type

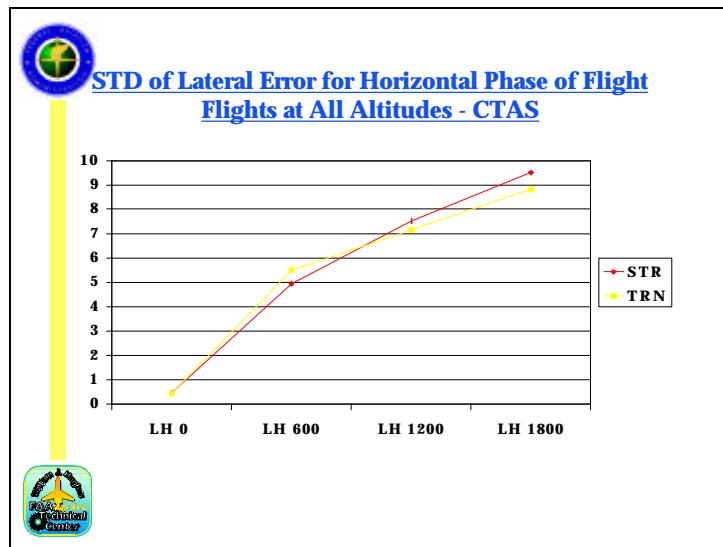
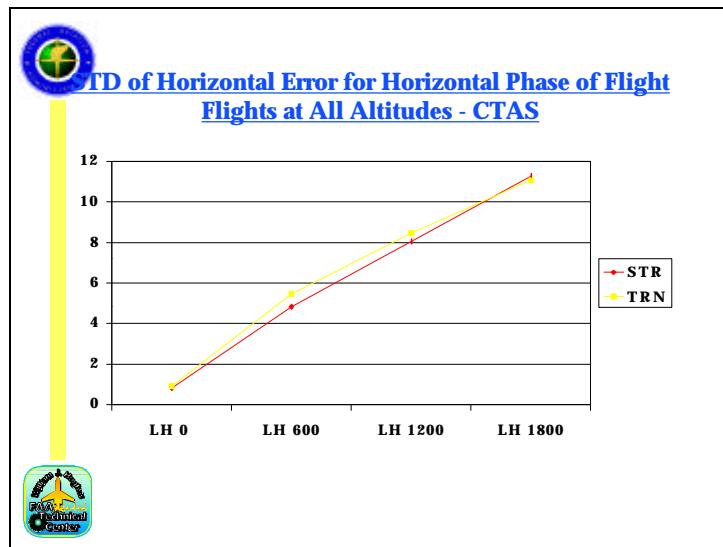


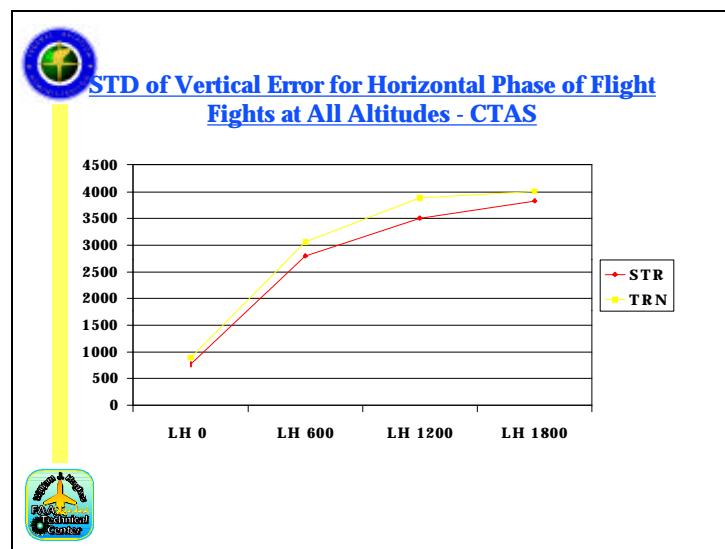
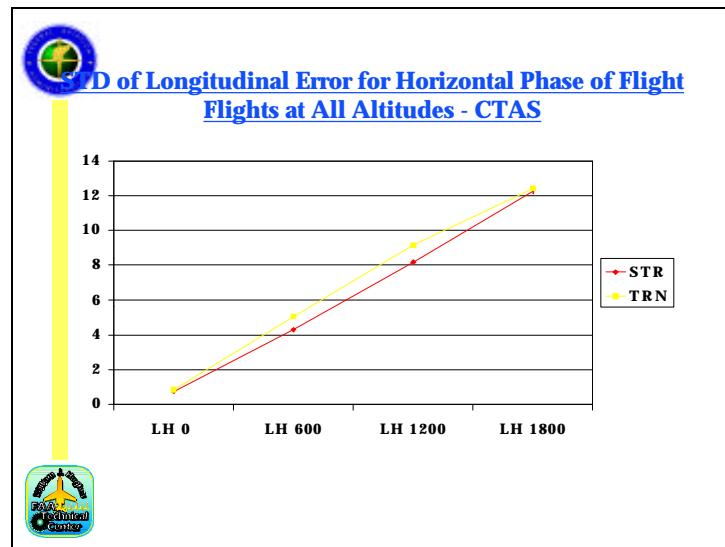


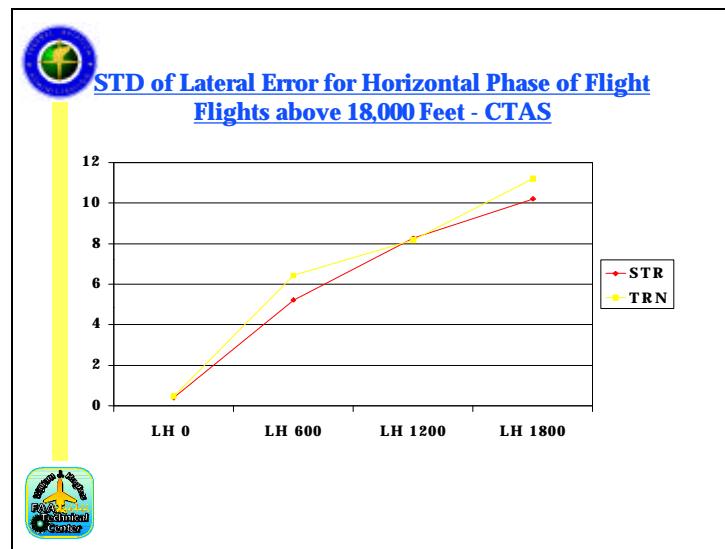
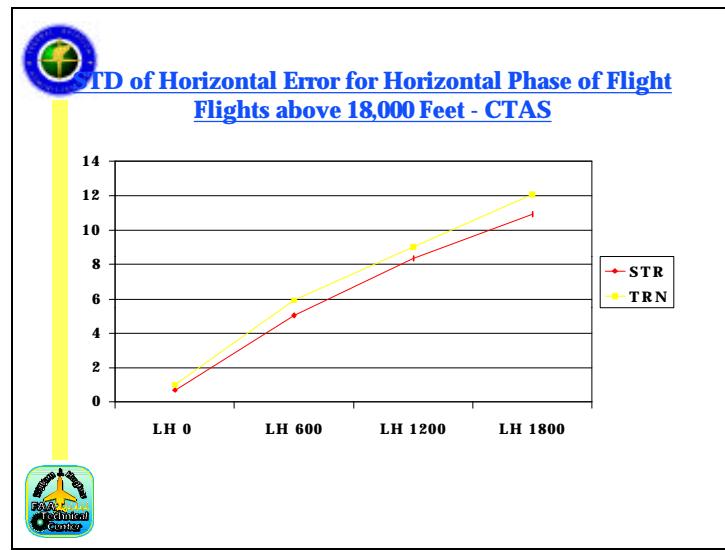


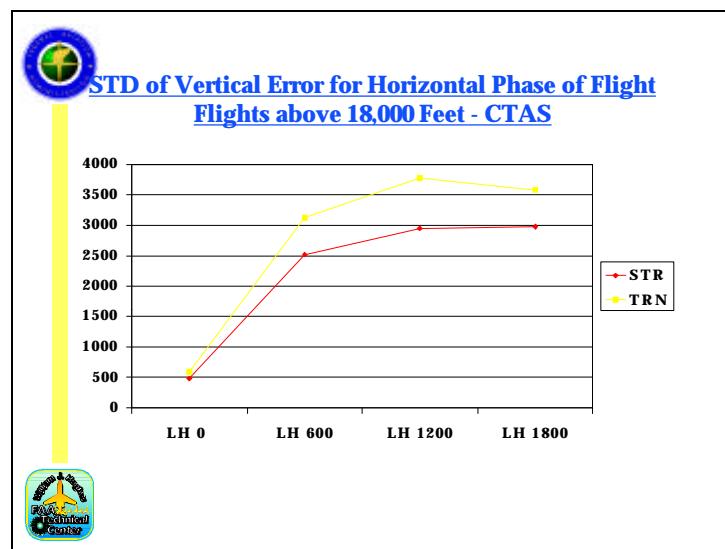
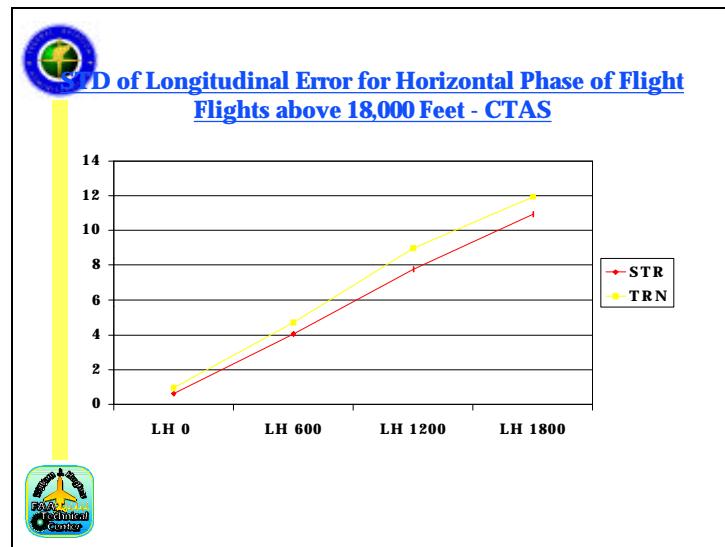


B.2.2. Horizontal Phase of Flight

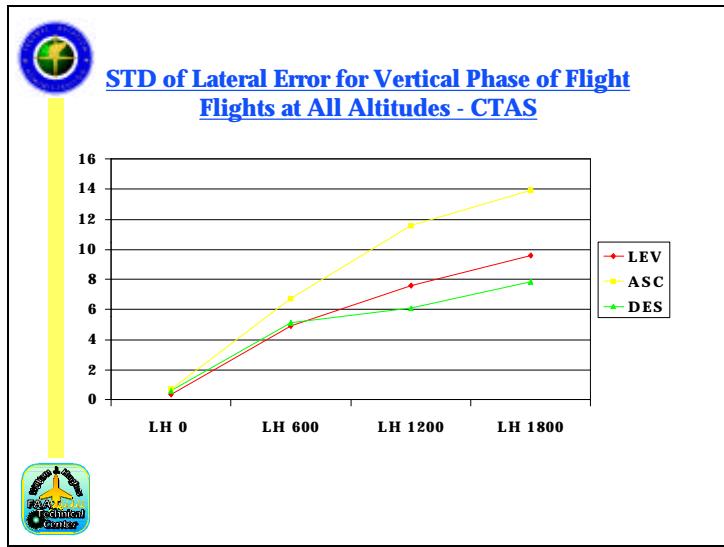
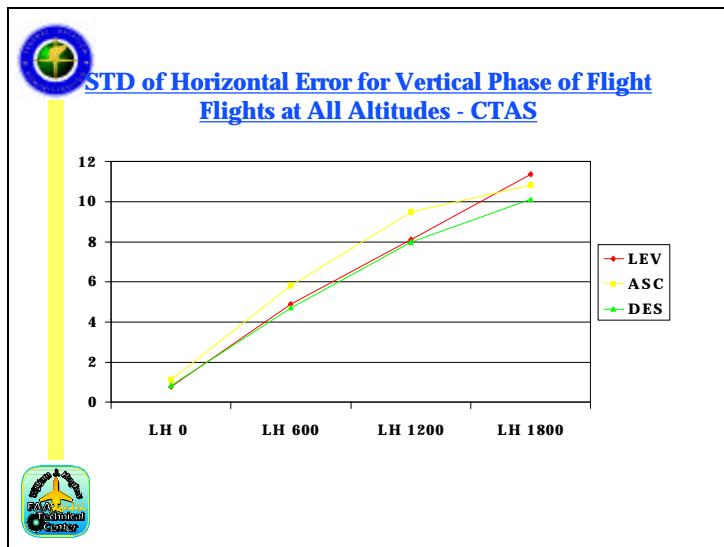


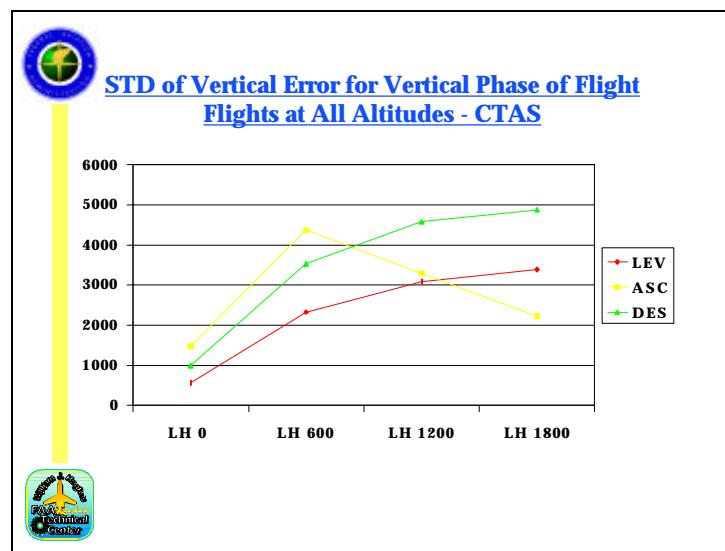
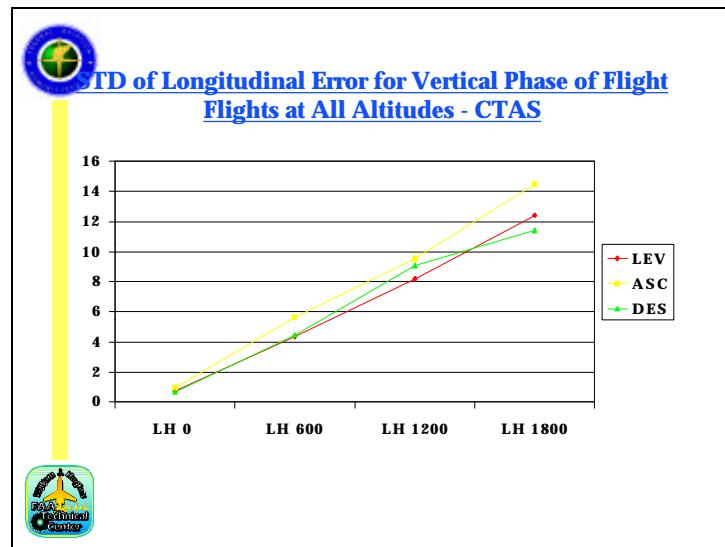


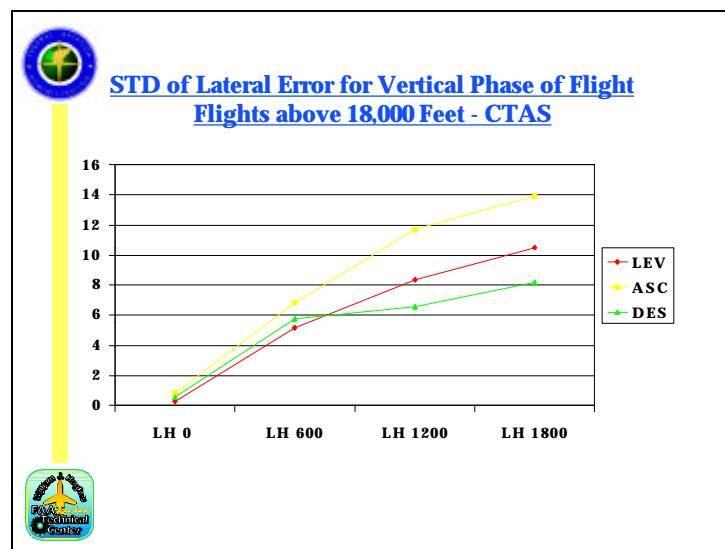
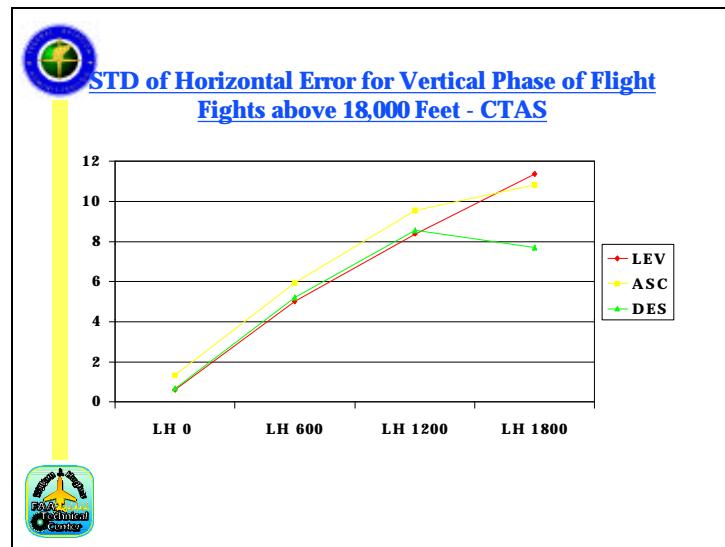


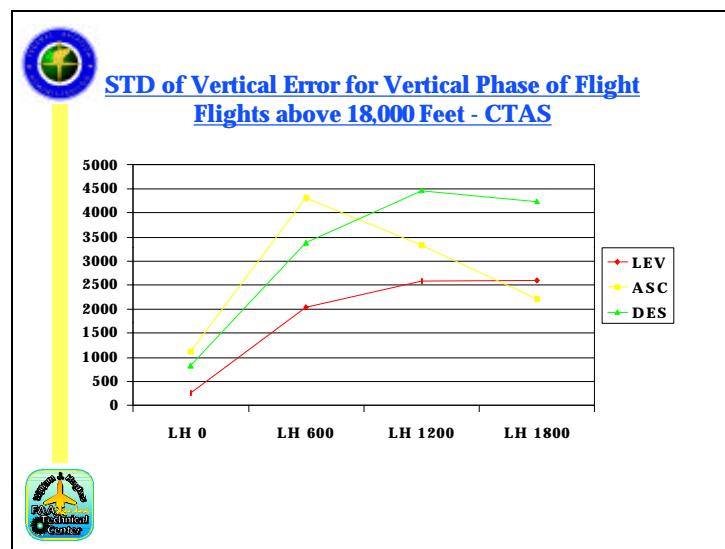
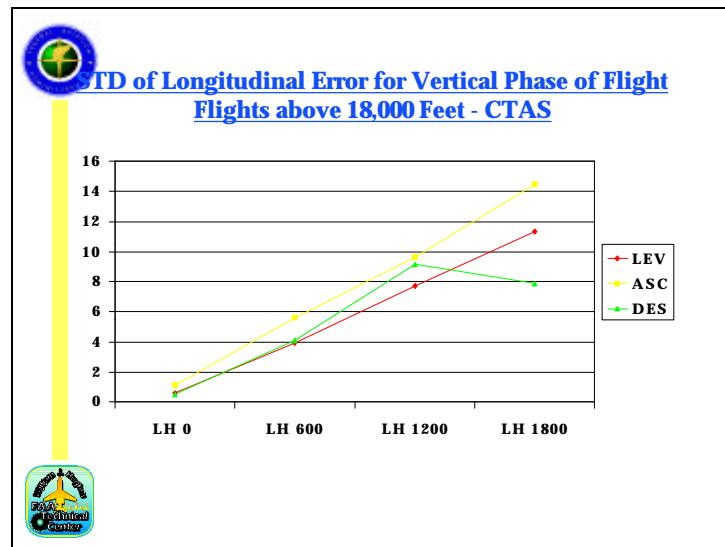


B.2.3. Vertical Phase of Flight









Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/ Center-TRACON Automation System (CTAS)

APPENDIX C: Additional Flight Observations

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APPENDIX C

C.0 Introduction to Appendix

This Appendix is a supplement to *Trajectory Prediction Accuracy Report: User Request Evaluation Tool (URET)/Center-TRACON Automation System (CTAS)*, FAA ACT-250, 1999. The Appendix contains observations of four anomalous flights (two URET and two CTAS). These flights were selected for detailed study because they exhibited large prediction errors. They were used to verify the software implementation of the methodology. They are included in this Appendix to help the reader understand the methodology. These examples are not necessarily common occurrences and they are not presented as being indicative of any algorithmic problems with either trajectory modeler.

C.1 URET Observations

C.1.1 URET2

This example, depicting a ZID overflight with adequate track data, provides an example of an aircraft with both large longitudinal errors and large lateral errors. These large prediction errors resulted because the predicted ground speed was in error for a period of time, the aircraft flew by a waypoint, and the trajectory was not updated.

The aircraft, an A320 airbus, overflew the ZID airspace after departing Detroit Metro bound for Cancun. Its flight plan shows that it planned to fly from the Waterville Ohio VORTAC (YWV) to the Rosewood Ohio VORTAC (ROD) to the Nashville VORTAC (BNA). The flight was picked up just north of the ZID airspace at 12:19:10 at Flight Level 277, climbing to Flight Level 350. The track data, which extends from 12:19:10 (44350 seconds) through 13:07:58 (47278 seconds), shows that it flew slightly to the west of that route. This can be seen in Figure C.1-1 which shows the interpolated track XY data and flight plan route. Figure C.1-2 shows the aircraft track altitude vs. time.

C.1.1.1 Track Data

The HCS track data required only one correction: the first report was deleted because it did not have an altitude value. All the other position reports passed the tests applied by RDTRACKS, with 245 HCS track reports remaining to be processed for this flight.

C.1.1.2 Trajectories

The entire track time line and the time line for the eight trajectories recovered for this aircraft are presented in Figure C.1-3. The time line for the track is labeled “Track”. The time lines for the trajectories are labeled with the trajectory's build time. These eight trajectories consist of four trajectory pairs. The trajectories in each pair are separated by one second in time. Trajectories with the same build time occur occasionally in URET. This happens when output queues build up due to the low priority of URET's data recording process. As a result, trajectories that were actually built at slightly different times may be time stamped with the same build time. Whenever such a trajectory was encountered in this study, one second was added to the build time of that trajectory. The first four trajectories (those labeled 43414 through 44339) were built before the first track point (44350 seconds). The first sample time is 44390. The trajectory used for this sample time was the 44363 trajectory since it was the latest trajectory prior to the sample time. All subsequent sampling and metric calculations use this trajectory also because no more trajectories were generated by URET.

C.1.1.3 Metrics

As can be seen from Figure C.1-4, initially the track and the trajectory are fairly close. The trajectory routed the flight directly from its current radar position to the next en route waypoint, the Rosewood VORTAC (ROD). However, the aircraft did not proceed to this waypoint but flew by it. The flyby created lateral errors between the trajectory and the track. The aircraft, in bypassing the waypoint, flew directly to the next waypoint, Nashville (BNA). The trajectory predicted the aircraft would fly to this waypoint. The track and the trajectory converged at the Nashville waypoint. Thus, the lateral errors became less and less as the aircraft got closer and closer to the Nashville waypoint. The vertical profile predicted was fairly close to the vertical profile flown. This can be seen in Figure C.1-2.

Figure C.1-5 shows the specific error geometry for a sample time of 44750 and a look ahead time of zero. The aircraft was near the Rosewood VORTAC at this time. The points labeled A, B, and C correspond to the similarly labeled points in Figure 2.5-3 in the report. B is the trajectory point being compared to the track point A. C is the next point on the trajectory, and AD is the

perpendicular to the line BC extended. The lateral error is AD, 3.76 nm, the longitudinal error is BD, 1.54 nm. The sign convention used here is that an aircraft arriving earlier than expected represents a positive longitudinal error, and that a track to the right of the predicted path represents a positive lateral error.

The aircraft flew faster than predicted in the climb to cruising altitude. The trajectory predicted the aircraft would increase its ground speed from 330 knots at FL 280 to 378 knots at FL 350. The airbus actually flew faster: 390 knots at FL 280 and 385 knots at FL 350. A longitudinal error was accumulated during the climb. In level cruise the actual and predicted ground speeds were fairly close. However, the longitudinal error caused by the error in predicted ground speed during the climb persists because the trajectory was not updated.

Table C.1-1 presents the trajectory metrics calculated for this aircraft.

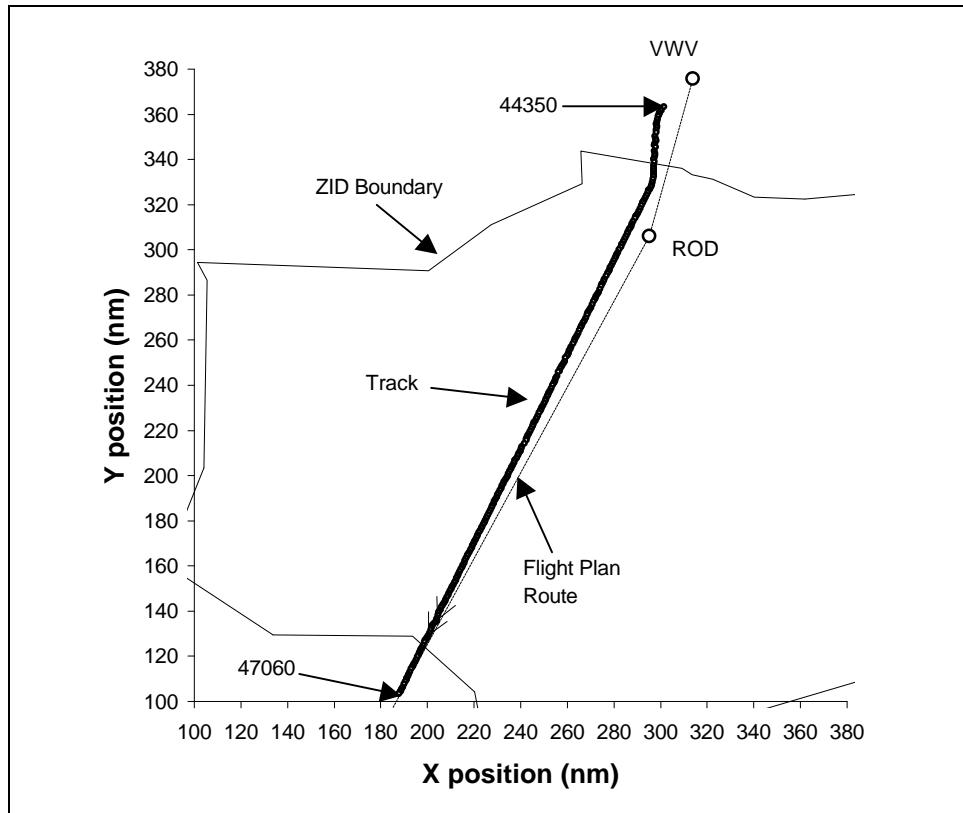


Figure C.1-1: Interpolated Track Position and Route

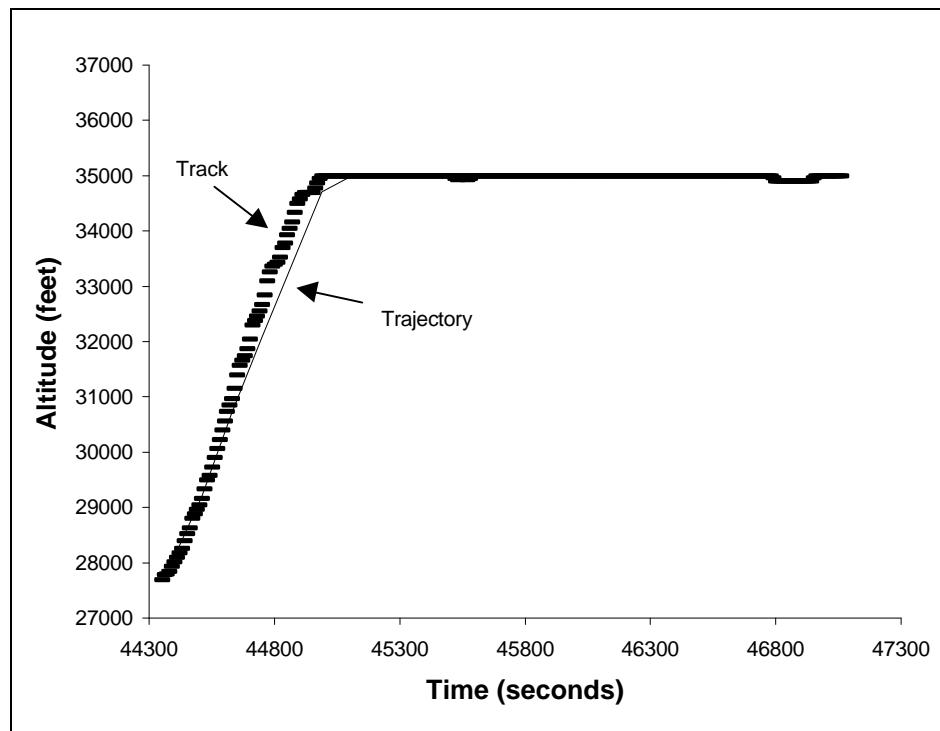


Figure C.1-2: Interpolated Track Altitude

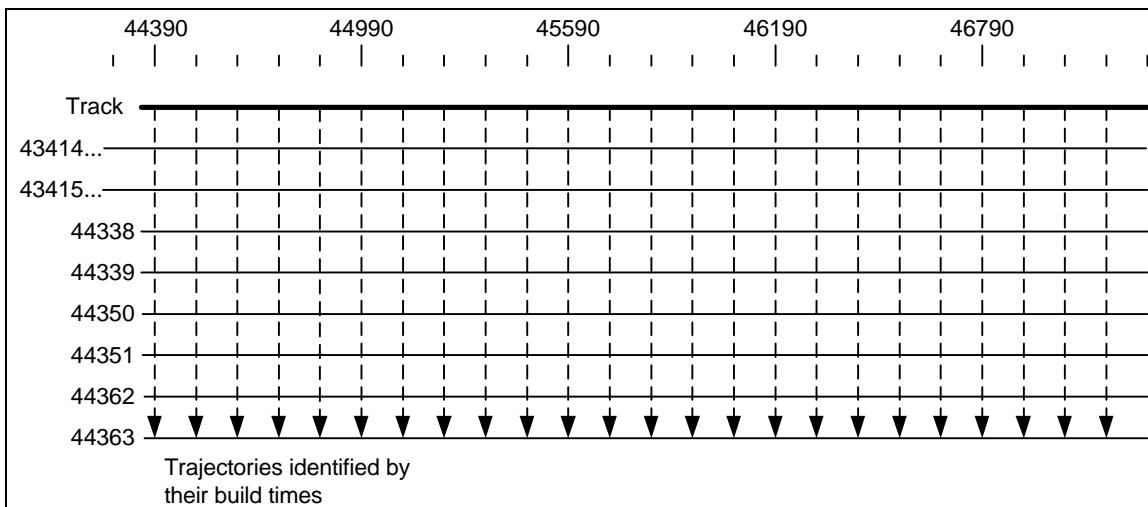


Figure C.1-3: Sampled Trajectories

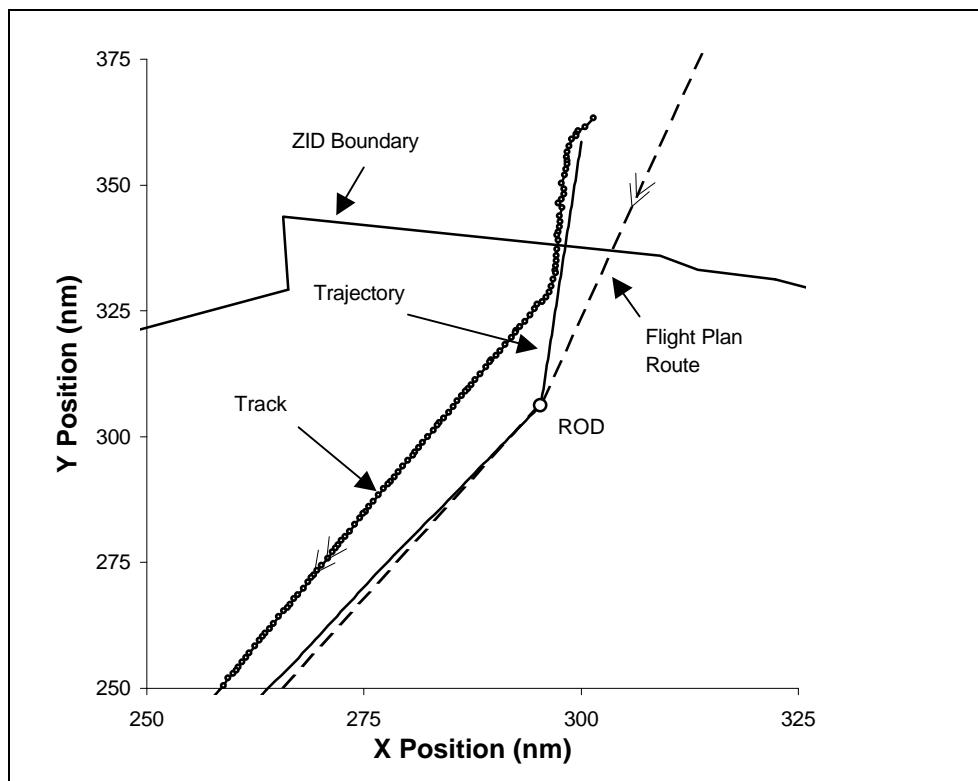


Figure C.1-4: Track XY and 44363 Trajectory

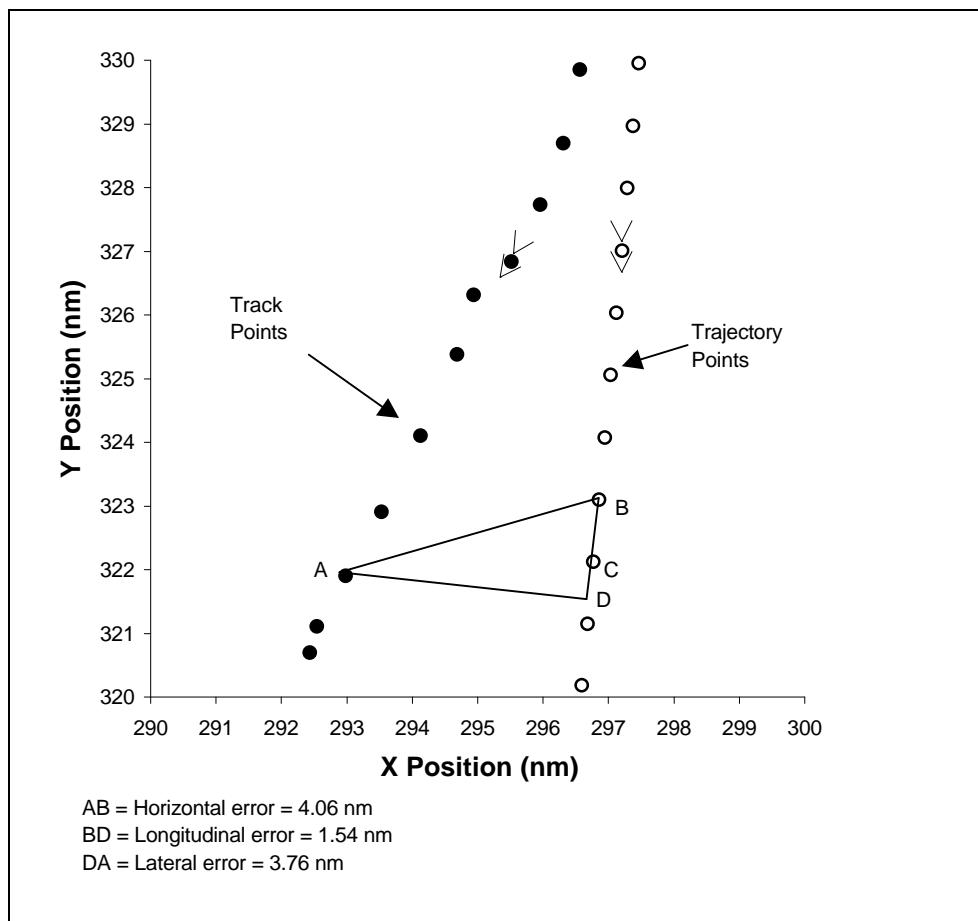


Figure C.1-5: XY Error Geometry at 44750, Look ahead = 0

Table C.1-1: Trajectory Metrics (1 of 3)¹

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
44390	44363	0	-1.02	0.69	-67.00
		300	1.35	1.30	455.93
		600	6.78	8.17	293.11
		900	7.32	6.02	0.00
		1200	7.75	3.82	0.00
		1500	7.89	1.67	0.00
		1800	7.73	-0.28	0.00
44510	44363	0	-0.17	1.26	-23.46
		300	1.72	6.02	696.62
		600	7.44	7.39	0.00
		900	7.59	5.54	0.00
		1200	7.67	2.73	0.00
		1500	7.34	1.08	0.00
		1800	8.67	-1.09	0.00
44630	44363	0	1.03	0.73	259.11
		300	5.83	8.51	644.83
		600	7.29	6.28	0.00
		900	7.42	4.58	-67.00
		1200	7.86	1.64	0.00
		1500	7.64	0.20	0.00
		1800	9.03	-0.94	0.00
44750	44363	0	1.54	3.76	591.77
		300	7.24	7.71	0.00
		600	7.35	5.88	0.00
		900	7.57	3.36	0.00
		1200	7.14	1.41	0.00
		1500	8.55	-0.77	0.00
		1800	9.36	-0.99	0.00
44870	44363	0	1.86	8.32	773.20
		300	7.73	6.75	0.00
		600	7.28	5.18	0.00
		900	7.80	2.19	0.00
		1200	7.52	0.66	0.00
		1500	8.80	-0.91	0.00
		1800	8.82	-0.73	0.00

¹ In this chart, longitudinal and lateral error are reported in hundredths of nautical miles, and the vertical error is reported in hundredths of feet. The precision of the input HCS altitude data is reported to the nearest 100 feet, the apparent difference is simply an artifact of the track report processing.

Table C.1-1: Trajectory Metrics (2 of 3)

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
44990	44363	0	6.78	8.17	293.11
		300	7.32	6.02	0.00
		600	7.75	3.82	0.00
		900	7.89	1.67	0.00
		1200	7.73	-0.28	0.00
		1500	9.16	-0.99	0.00
		1800	9.46	-0.99	-33.00
45110	44363	0	7.44	7.39	0.00
		300	7.59	5.54	0.00
		600	7.67	2.73	0.00
		900	7.34	1.08	0.00
		1200	8.67	-1.09	0.00
		1500	9.49	-0.94	0.00
45230	44363	0	7.29	6.28	0.00
		300	7.42	4.58	-67.00
		600	7.86	1.64	0.00
		900	7.64	0.20	0.00
		1200	9.03	-0.94	0.00
		1500	9.30	-0.80	0.00
45350	44363	0	7.35	5.88	0.00
		300	7.57	3.36	0.00
		600	7.14	1.41	0.00
		900	8.55	-0.77	0.00
		1200	9.36	-0.99	0.00
45470	44363	0	7.28	5.18	0.00
		300	7.80	2.19	0.00
		600	7.52	0.66	0.00
		900	8.80	-0.91	0.00
		1200	8.82	-0.73	0.00
45590	44363	0	7.75	3.82	0.00
		300	7.89	1.67	0.00
		600	7.73	-0.28	0.00
		900	9.16	-0.99	0.00
		1200	9.46	-0.99	-33.00

Table C.1-1: Trajectory Metrics (3 of 3)

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
45710	44363	0	7.67	2.73	0.00
		300	7.34	1.08	0.00
		600	8.67	-1.09	0.00
		900	9.49	-0.94	0.00
45830	44363	0	7.86	1.64	0.00
		300	7.64	0.20	0.00
		600	9.03	-0.94	0.00
		900	9.30	-0.80	0.00
45950	44363	0	7.14	1.41	0.00
		300	8.55	-0.77	0.00
		600	9.36	-0.99	0.00
46070	44363	0	7.52	0.66	0.00
		300	8.80	-0.91	0.00
		600	8.82	-0.73	0.00
46190	44363	0	7.73	-0.28	0.00
		300	9.16	-0.99	0.00
46310	44363	0	8.67	-1.09	0.00
		300	9.49	-0.94	0.00
46430	44363	0	9.03	-0.94	0.00
		300	9.30	-0.80	0.00
46550	44363	0	9.36	-0.99	0.00
46670	44363	0	8.82	-0.73	0.00
46790	44363	0	9.46	-0.99	-33.00

C.1.2 URET3

This example shows how trajectory errors can be large when a trajectory modeler produces a single, erroneous trajectory, and how modeling instantaneous turns affects the trajectory metrics. This flight was a general aviation aircraft twin jet Gulfstream that departed Dulles Airport (IAD) and returned via the Youngstown Ohio (YNG) and Charleston West Virginia (HVQ) VORTACs. The interpolated XY track data and route are shown in Figure C.1-6. This is the eastern side of ZID. The radar track started in the Cleveland ARTCC (ZOB) at 15:01:22 (54082 seconds). The track data was interpolated each 10 seconds over the interval from 15:01:30 (54090 seconds) through 15:34:20 (56060 seconds), a duration of 1970 seconds or 32.8 minutes. The aircraft was in level flight at Flight Level 450 for most of this interval, making a 100 degree turn at the Charleston VORTAC to head back to Dulles.

C.1.2.1 Track Data

The HCS track data started with the aircraft in ZOB, at altitude approaching ZID, flying from the Youngstown VORTAC (YNG) to the Charleston VORTAC (HVG). The first two track reports had zero altitude and were discarded. There were 217 track reports. However, as the aircraft followed the Charleston transition to the Jasen1 STAR, the HCS lost altitude data when the aircraft was between the DILNN and FINKS fixes. After 15:34:22 there were no more altitude reports. The track was terminated at this point for analysis purposes. 166 reports remained to be used for analysis. During the period of no altitude data, the track was completely lost for 3408 seconds or 56.8 minutes. When the track was re-acquired, the ground speed was reported to be about 50 knots.

It was necessary to correct two of the 166 track reports by interpolation. The first was corrected because it reported the aircraft had not moved since its previous report. The second was corrected because it reported the aircraft was flying too slowly (270 knots) compared to its immediately previous speed of 417 knots.

C.1.2.2 Trajectories

Figure C.1-7 presents the trajectories generated for this aircraft. The individual trajectories are identified by their build times in seconds. The arrowheads are placed at two minute intervals and mark the sampling times. The three trajectories, built before the track started at 53134, 53303, and 54058 seconds, were not sampled. The trajectory used for the first sample (54130) was built at the time the track started (54082 seconds). This trajectory began at the approximate current position of the aircraft and predicted it would return directly to Dulles Airport (see Figure C.1-8).

Since another trajectory was not calculated until 336 seconds later at 54418 seconds, trajectory metrics were calculated for three sample times using this trajectory. The aircraft was still in ZOB at each of these sample times. Because the track and trajectory were diverging, large errors were found at each measurement. The largest horizontal error at a look ahead time of zero seconds was 42.4 nautical miles at a sample time of 54370 seconds. In addition, the trajectory descended the aircraft as it got closer to the airport. Because the aircraft was actually in level flight a vertical error of 2200 feet was incurred at the last measurement on this trajectory (look ahead time of zero).

Four additional trajectories were used, for which there was close agreement between the actual track and the track predictions with one exception. This exception occurred at the Charleston VORTAC when the aircraft turned to return to Dulles and cut the inside of the corner (or flew by the waypoint). Since URET models instantaneous turns, the horizontal separation between track and trajectory exceeded four nautical miles. A sample was taken during the turn at 55330 seconds, which had a horizontal error of 2.2 nautical miles. Figure C.1-9 shows the actual

location of the aircraft, the predicted location of the aircraft, and the horizontal error for this measurement².

C.1.2.3 Metrics

Table C.1-2 presents the trajectory metrics calculated for this aircraft. The longitudinal and lateral errors are in nautical miles; the vertical errors are in feet. As discussed in Section 2.5.1, a sample is taken 40 seconds after the start of track and then repeated each two minutes until the track ends, the trajectory ends, or the track leaves the center. At each sample time the distance between the track and trajectory was calculated at the current time and at look ahead times of zero and at 300 second or five minute increments into the future; resulting in look ahead times of 300, 600, 900, 1200, 1500, and 1800 seconds. This flight exited ZID at 15:28:20 (55700 seconds). From the table it can be seen that as the aircraft approached the center boundary, the metrics for fewer and fewer look ahead times were calculated.

As stated earlier, large errors are present at the first three samples times (54130, 54250, and 54370 seconds) when the trajectory with a build time of 54082 seconds was used. The errors are more representative starting with the fourth sample (54490 seconds).

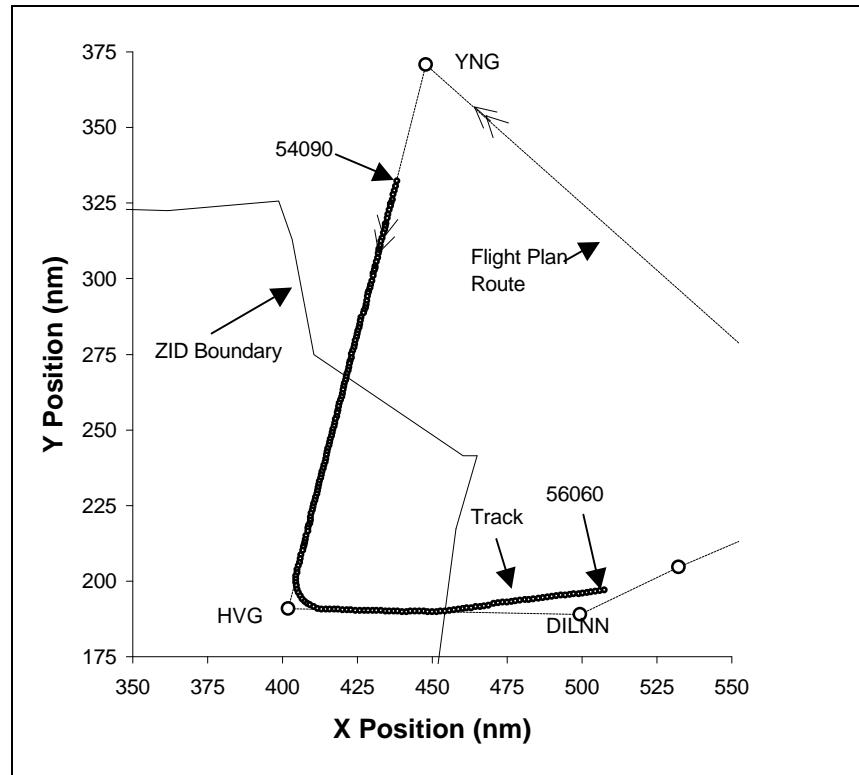


Figure C.1-6: Interpolated Track and Route XY Position

² The longitudinal error is normally the along track error, but for a short time just after a sharp turn the lateral error becomes the along track error.

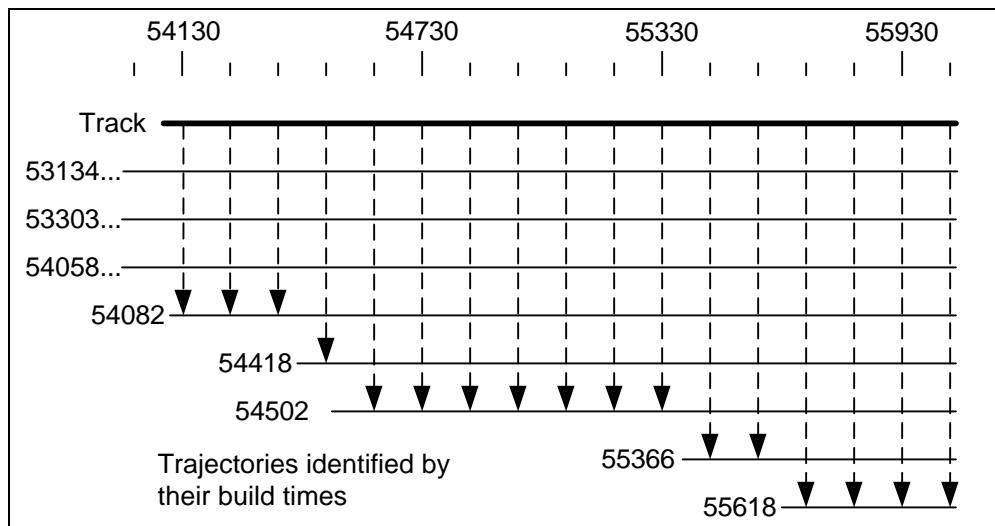


Figure C.1.7: Sampled Trajectories

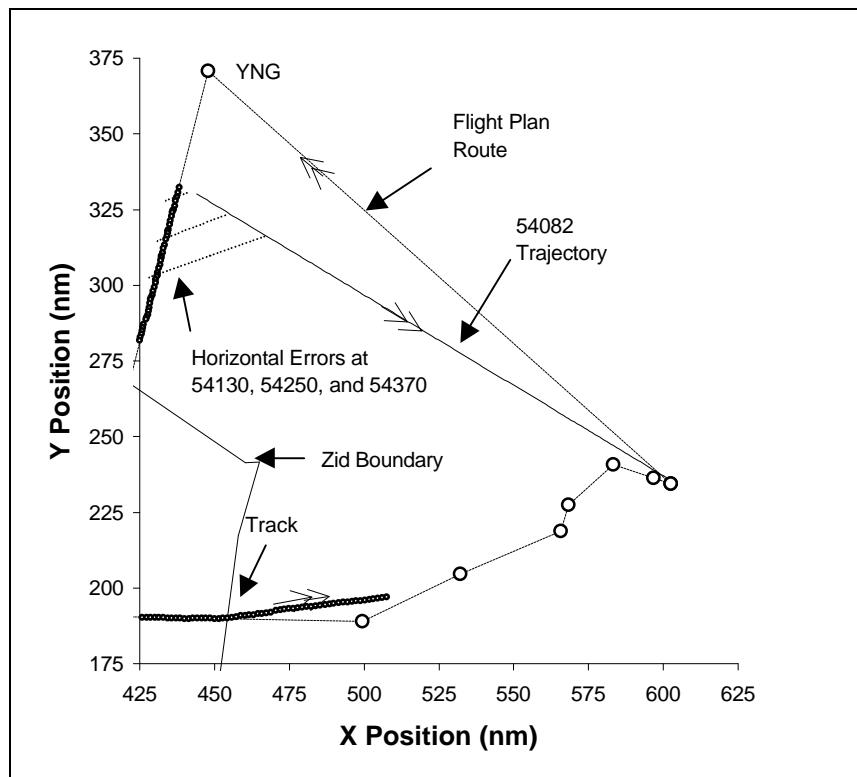


Figure C.1.8: Sampled Points Along 54082 Trajectory

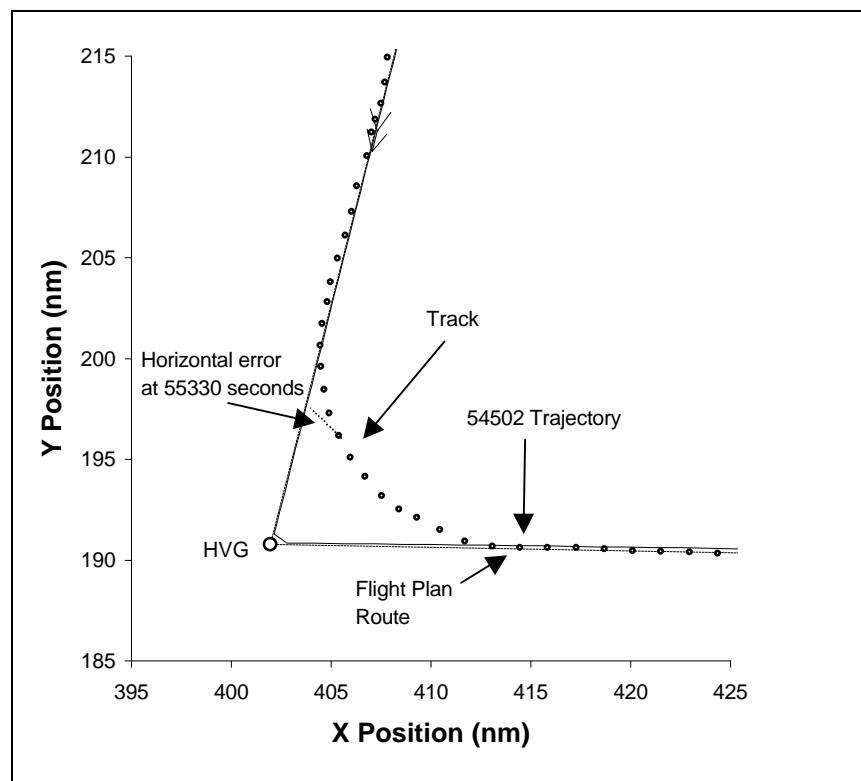


Figure C.1-9: Sampled Point During Turn

Table C.1-2: Trajectory Metrics

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
54130	54082	0	-4.14	7.19	0.00
		300	-32.58	38.93	3922.04
		600	-58.15	71.88	14420.54
		900	-84.79	103.76	22300.08
		1200	-109.33	134.87	32507.66
		1500	-99.82	120.34	38907.87
54250	54082	0	-16.18	19.99	0.00
		300	-42.87	52.50	8395.25
		600	-68.72	84.70	17631.89
		900	-95.77	115.83	25785.61
		1200	-107.08	132.88	35100.00
54370	54082	0	-27.53	32.23	2188.53
		300	-53.10	65.49	12376.71
		600	-79.36	97.45	20728.90
		900	-106.71	129.48	30746.50
		1200	-102.37	124.60	37473.73
54490	54418	0	1.67	0.19	0.00
		300	7.48	0.17	100.00
		600	12.63	0.38	0.00
		900	14.50	-7.99	0.00
		1200	36.58	0.22	100.00
54610	54502	0	0.37	0.15	100.00
		300	0.78	0.22	100.00
		600	0.38	0.11	100.00
		900	8.91	0.23	0.00
54730	54502	0	0.59	0.08	0.00
		300	0.84	0.26	0.00
		600	0.99	-1.93	100.00
		900	9.14	0.35	0.00
54850	54502	0	0.73	0.23	0.00
		300	0.31	0.06	0.00
		600	8.73	0.10	100.00
54970	54502	0	0.84	0.26	0.00
		300	1.31	0.26	0.00
		600	8.99	0.36	200.00
55090	54502	0	0.85	0.38	0.00
		300	6.85	-4.69	0.00
		600	9.68	0.17	1553.77
55210	54502	0	0.38	0.11	100.00
		300	8.91	0.23	0.00
55330	54502	0	0.99	-1.93	100.00
		300	9.14	0.35	0.00
55450	55366	0	-1.16	0.10	100.00
55570	55366	0	-0.75	0.36	200.00
55690	55618	0	0.14	-0.06	100.00

C.2 CTAS Observations

C.2.1 CTAS2

This example shows how trajectory errors can increase rapidly when updated trajectories are no longer available. In this example the aircraft flew faster than predicted. This resulted in large longitudinal errors when the trajectories were not updated. The lateral errors were minimal while the aircraft flew a straight line track, but a sharp turn on the SASIE SID caused a large lateral error briefly.

C.2.1.1 Track Data

The aircraft, a Piper Malibu, flew from the Beech factory in Wichita to the Addison airport near Dallas. The original Flight Plan routed the aircraft via the VORTACs at Pioneer (at Ponca City) (PER), Will Rogers (at Oklahoma City) (IRW), and Ardmore (ADM). Amendments rerouted the flight to the Bonham (BYP) VORTAC and the SASIE STAR, by passing the IRW and ADM VORTACs.

The aircraft was already at altitude (21,000 feet) when it was picked up by ZFW. The track data recovered for this aircraft began at 20:36:49 (74209 seconds) and ended at 21:37:13 (77833).

This data was interpolated each ten seconds over the interval from 20:36:50 (74210 seconds) through 21:37:10 (77830 seconds), a duration of 3620 seconds, or approximately one hour.

Figure C.2-1 presents a plot of the interpolated XY track data and Figure C.2-2 presents the interpolated altitude track data plotted against track time. This track began between the Pioneer and Will Rogers VORTACs in the Kansas City ARTCC (ZKC). Shortly after the start of the track, the Flight Plan was amended to fly to Addison Airport via the Bonham (BYP) VORTAC instead of the Will Rogers and Ardmore VORTACs. Also the aircraft was redirected to SASIE and never actually flew to BYP.

C.2.1.1.1 Time Adjustment

The time stamps assigned by the CTAS recording operation were first rounded to the nearest second and then adjusted by adding or subtracting seconds so the track reports all occurred at intervals of 12 seconds or at intervals of integer multiples of 12 seconds. Table C.2-1 shows the counts of the time intervals after rounding and before adjustment, after adjustment, and after correction processing. After the time adjustment there were 15 24-second intervals or 15 missing position reports. They were inserted by interpolation. There was one stationary point in the input data; it was replaced, also by interpolation.

C.2.1.2 Trajectories

Figure C.2-3 presents the track time line and the time lines for 15 of the 116 trajectories recovered for this aircraft. The time line is labeled “Track”. Each of the trajectories is labeled with the trajectory's build time. The trajectory sampled for the starting sample time (74250 seconds) was the 74244 trajectory, since this was the latest trajectory prior to the sample time. The sampling interval used in this study was 120 seconds. The trajectory used for the next sample time ($74250+120 = 74370$ seconds) was the 74363 trajectory. This process of associating the last valid trajectory with a sample time was continued for the entire track. As a result 13 of the 116 trajectories were used: 74244, 74363, 74484, 74604, 74723, 74844, 74963, 75083, 75203, 75323, 75443, 75565, and 75647.

The first two trajectories follow the Flight Plan as it was originally filed to the Will Rogers VORTAC and then proceed to join the route from the current position to the Bonham VORTAC. Subsequent trajectories follow the Flight Plan as it was amended.

C.2.1.3 Metrics

The predictions, for a zero look ahead time, closely match the actual flight until the 75647 trajectory, which was the last trajectory CTAS provided. The predicted ground speed was about 50 knots less than the actual ground speed for each trajectory. As long as the trajectories kept getting updated, the position error for the zero look ahead time remains small. But as the track diverged longitudinally from the trajectory, as the trajectory got older, large longitudinal errors were calculated. Figure C.2-4 provides a plot of the values of the X coordinates of the track and the trajectory (the 75647 trajectory), and shows the X component of the horizontal error increasing with time. Similarly, Figure C.2-5 shows the Y component of the horizontal error increasing with time. These figures show the trajectory's XY data is accurate but displaced in time.

Figure C.2-6 is a plot of altitude vs time for the track and the trajectory. The predicted Top of Descent (TOD) is in error in all of the predicted trajectories by about 74 nautical miles. This causes large altitude errors in the descent phase of the flight.

Table C.2-2 presents the trajectory metrics calculated for this aircraft.

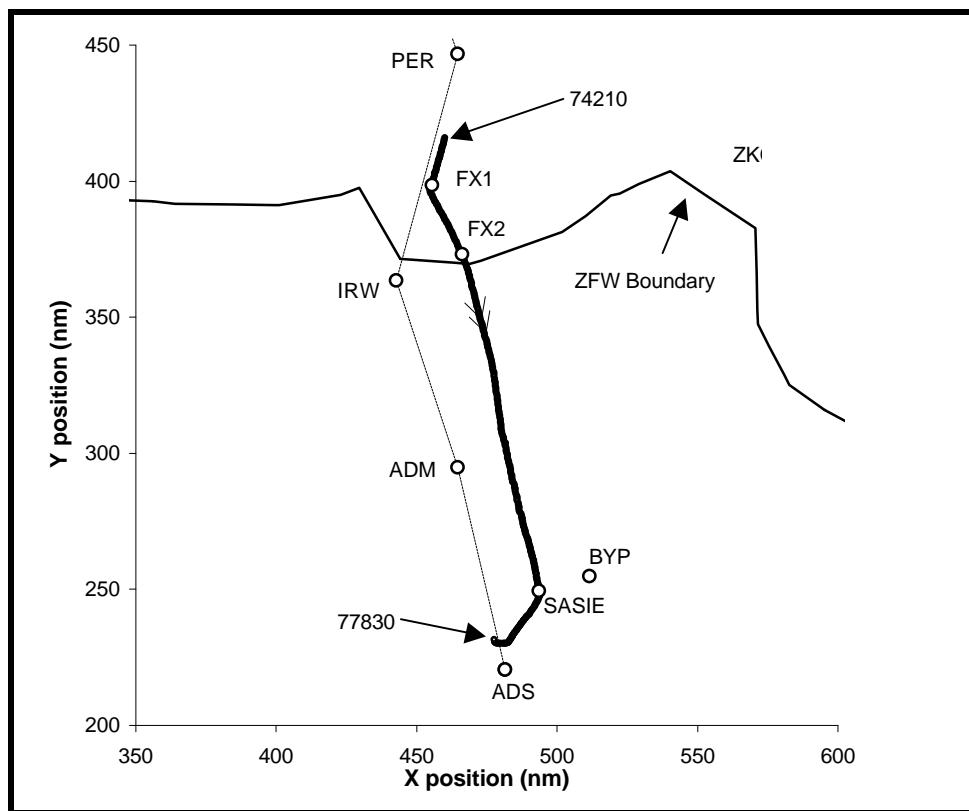


Figure C.2-1: Track XY Position

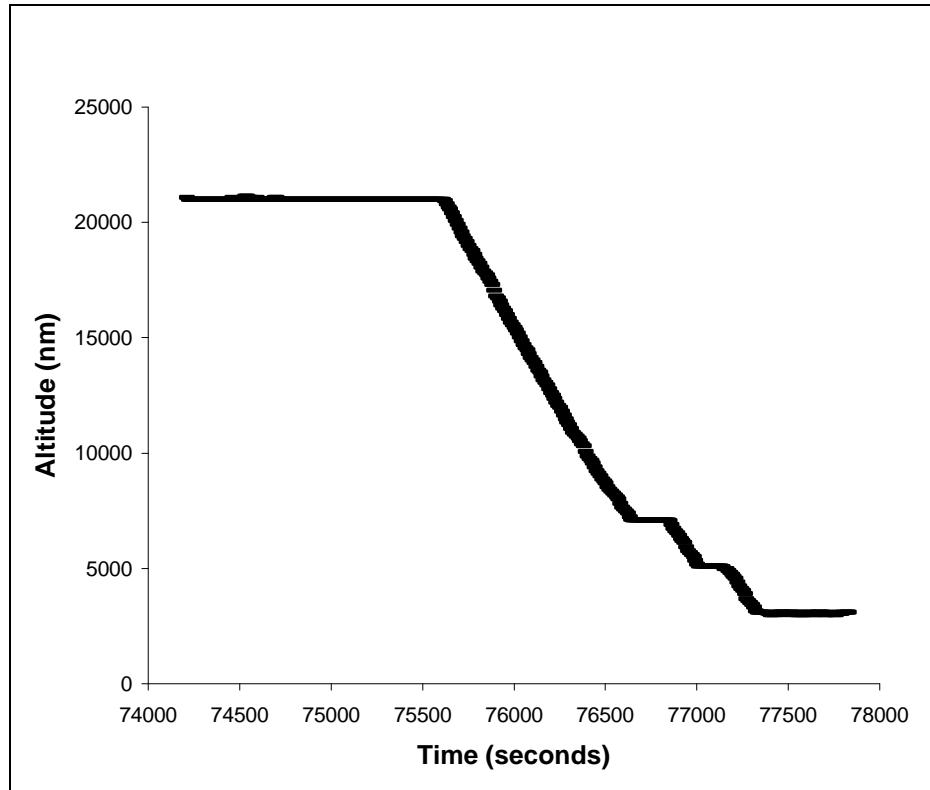


Figure C.2-2: Track Altitude

Table C.2-1: Track Report Time Intervals for CTAS 2

Gap Size (Seconds)	Count Before Adjustment	Count After Adjustment	Count After Processing
11	52	0	0
12	164	272	302
13	56	0	0
23	3	0	0
24	11	15	0
25	1	0	0

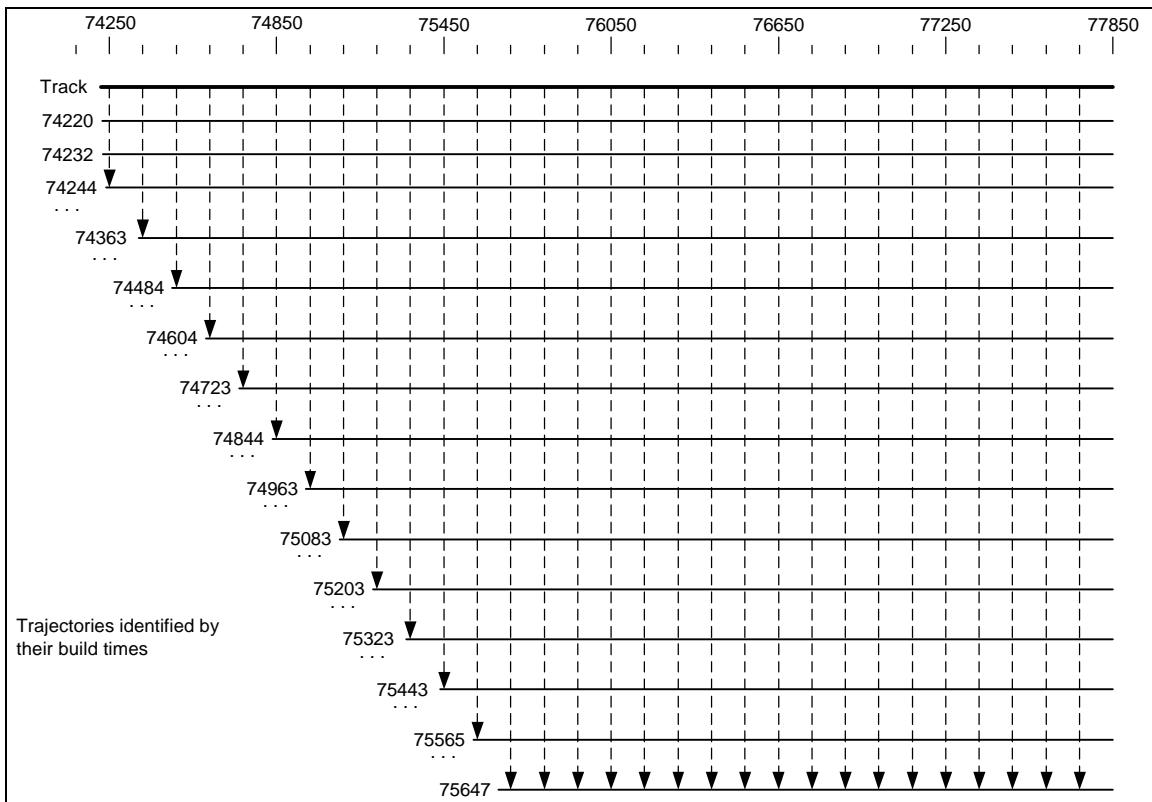


Figure C.2-3: Sampled Trajectories

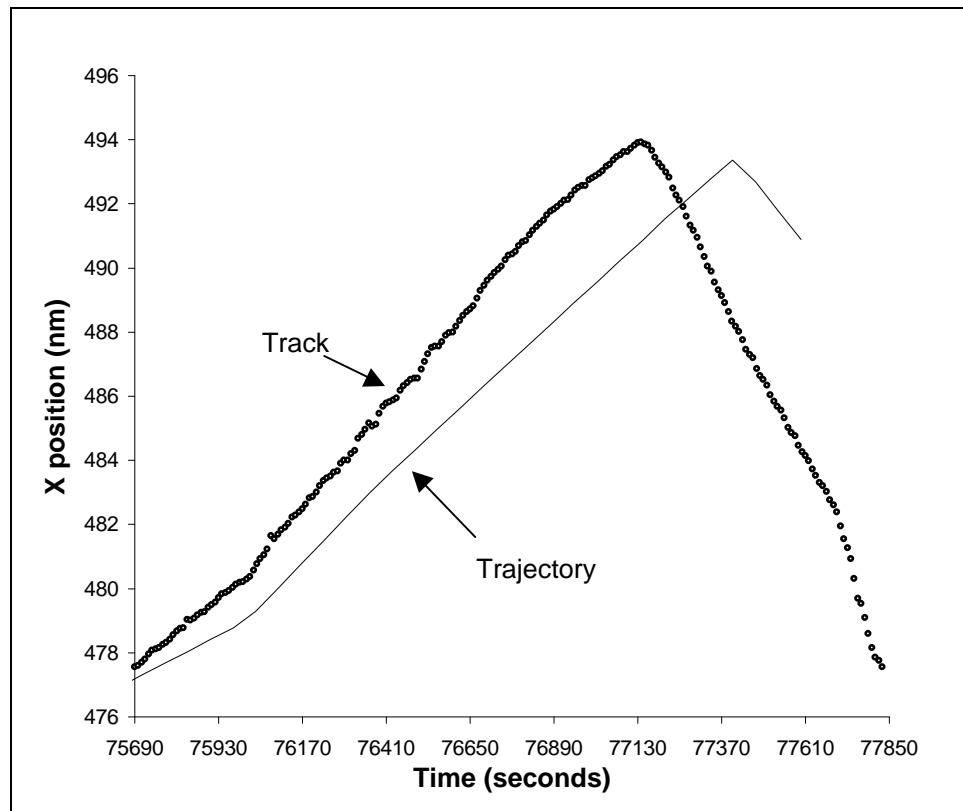


Figure C.2-4: Track X and 75647 Trajectory X

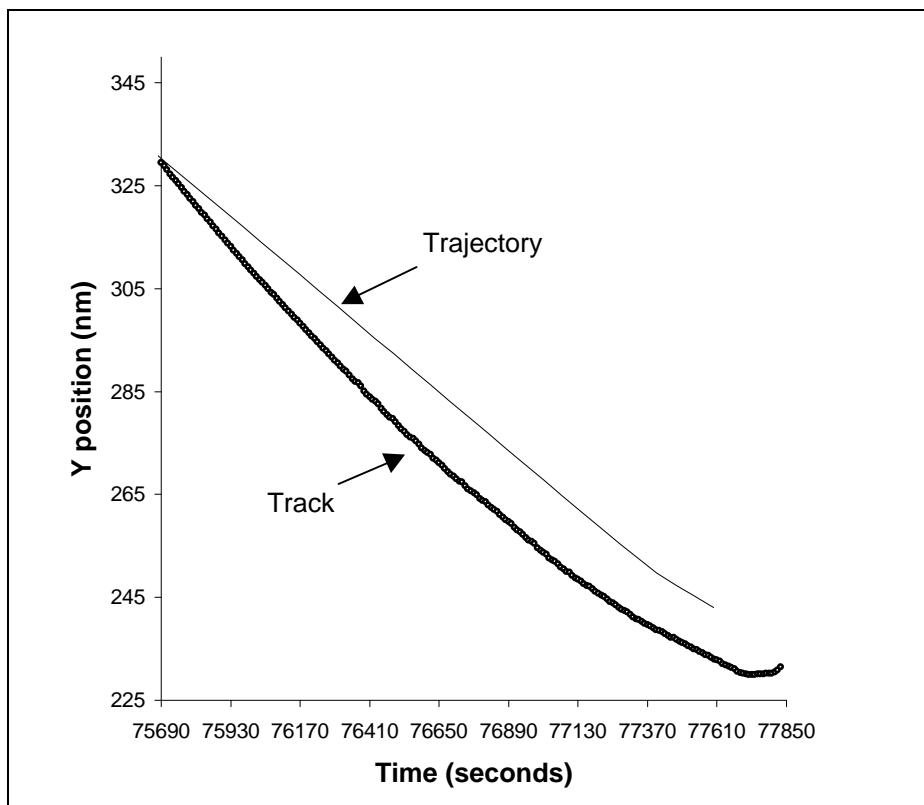


Figure C.2-5: Track Y and 75647 Trajectory Y

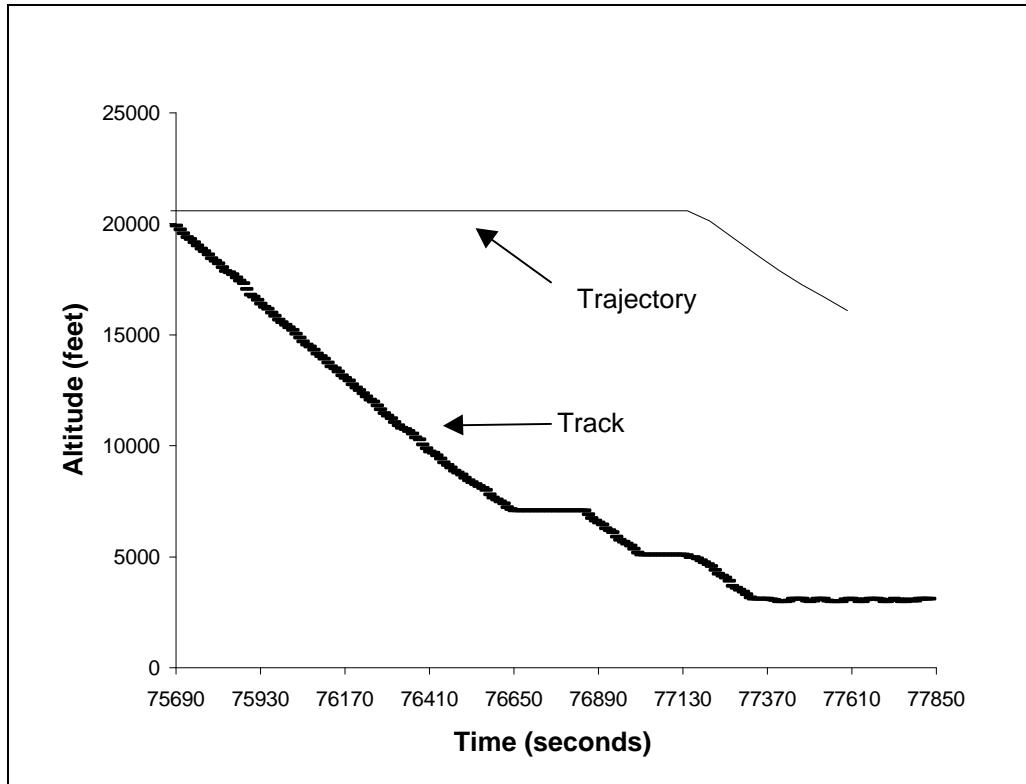


Figure C.2-6: Track and 75647 Trajectory Altitude vs Time

Table C.2-2: Trajectory Metrics (1 of 4)³

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
74250	74244	0	0.01	-0.03	0.00
		300	3.49	-0.82	100.00
		600	5.05	-13.08	0.00
		900	7.59	-25.29	0.00
		1200	11.24	-35.63	0.00
		1500	39.59	0.01	-1983.00
		1800	39.76	11.36	-6283.00
74370	74363	0	-0.02	-0.01	0.00
		300	3.15	-4.54	0.00
		600	4.56	-18.17	0.00
		900	7.69	-29.31	0.00
		1200	37.60	-6.36	0.00
		1500	38.23	4.74	-3542.00
		1800	38.17	15.18	-7942.00

³ In this chart, longitudinal and lateral error are reported in hundredths of nautical miles, and the vertical error is reported in hundredths of feet. The precision of the input HCS altitude data is reported to the nearest 100 feet, the apparent difference is simply an artifact of the track report processing.

Table C.2-2: Trajectory Metrics (2 of 4)

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
74490	74484	0	0.02	-0.04	0.00
		300	1.98	-9.94	0.00
		600	3.95	-23.03	0.00
		900	8.51	-33.32	0.00
		1200	36.14	-2.42	-1083.00
		1500	36.55	9.50	-5442.00
		1800	36.19	19.00	-9642.00
74610	74604	0	0.00	-0.02	0.00
		300	3.01	-0.66	0.00
		600	6.01	0.72	0.00
		900	8.90	3.03	0.00
		1200	12.41	6.45	-2783.00
		1500	15.11	10.67	-7083.00
		1800	16.87	13.69	-11242.00
74730	74723	0	-0.05	-0.06	0.00
		300	4.12	-0.32	0.00
		600	7.94	1.76	0.00
		900	11.80	3.91	-183.00
		1200	16.84	8.33	-4583.00
		1500	19.91	11.95	-8783.00
		1800	22.29	14.81	-12642.00
74850	74844	0	0.01	-0.01	0.00
		300	4.23	0.26	0.00
		600	8.16	2.64	0.00
		900	12.52	5.53	-1983.00
		1200	16.84	9.90	-6283.00
		1500	19.66	13.14	-10342.00
		1800	20.81	15.74	-13900.00
74970	74963	0	-0.03	-0.09	0.00
		300	4.44	-1.41	0.00
		600	8.96	-1.85	0.00
		900	14.44	-0.60	-3542.00
		1200	18.96	0.38	-7942.00
		1500	22.40	0.26	-11983.00
		1800	23.26	-0.31	-13900.00
75090	75083	0	-0.02	-0.04	0.00
		300	4.73	-1.82	0.00
		600	9.47	-1.79	-1083.00
		900	15.12	0.19	-5442.00
		1200	18.90	0.33	-9642.00
		1500	21.64	0.21	-13342.00
		1800	21.68	-0.54	-14442.00

Table C.2-2: Trajectory Metrics (3 of 4)

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
75210	75203	0	-0.01	-0.08	0.00
		300	5.00	-1.84	0.00
		600	10.28	-1.02	-2783.00
		900	15.08	0.18	-7083.00
		1200	18.70	0.15	-11242.00
		1500	20.33	-0.28	-13900.00
		1800	20.18	-0.25	-15900.00
75330	75323	0	0.08	0.00	0.00
		300	4.56	-1.21	-183.00
		600	10.62	-0.31	-4583.00
		900	14.77	0.19	-8783.00
		1200	17.94	0.10	-12642.00
		1500	18.44	-0.47	-13900.00
		1800	17.88	-0.17	-15900.00
75450	75443	0	0.01	-0.04	0.00
		300	5.14	-0.83	-1983.00
		600	10.56	-0.01	-6283.00
		900	14.33	0.18	-10342.00
		1200	16.28	0.04	-13900.00
		1500	16.58	-0.44	-15242.00
		1800	14.36	2.51	-16048.00
75570	75565	0	0.05	-0.01	0.00
		300	5.81	-0.44	-3542.00
		600	10.50	0.26	-7942.00
		900	13.94	0.27	-11983.00
		1200	14.82	-0.38	-13900.00
		1500	14.86	-0.30	-15900.00
		1800	10.77	6.28	-15247.46
75690	75647	0	0.83	-0.28	-683.00
		300	7.11	-0.08	-5042.00
		600	11.01	0.71	-9242.00
		900	13.96	0.26	-12942.00
		1200	14.22	-0.53	-14042.00
		1500	13.32	0.89	-15493.45
		1800	11.92	1.45	-14068.17
75810	75647	0	3.56	-0.39	-2383.00
		300	8.81	0.33	-6683.00
		600	12.57	0.46	-10842.00
		900	14.41	-0.20	-13500.00
		1200	14.47	-0.34	-15500.00
		1500	11.52	4.35	-15614.63
75930	75647	0	6.02	-0.44	-4183.00
		300	10.29	0.51	-8383.00
		600	13.64	0.21	-12242.00
		900	14.35	-0.49	-13500.00
		1200	14.01	-0.25	-15500.00
		1500	11.85	2.07	-14591.77

Table C.2-2: Trajectory Metrics (4 of 4)

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
76050	75647	0 300 600 900 1200 1500	7.94 11.82 13.99 14.48 12.44 11.73	0.38 0.65 0.10 -0.51 2.44 1.91	-5883.00 -9942.00 -13500.00 -14842.00 -15565.91 -13523.00
76170	75647	0 300 600 900 1200	9.55 13.16 14.24 14.47 10.43	0.55 0.45 -0.38 -0.33 6.25	-7542.00 -11583.00 -13500.00 -15500.00 -15157.46
76290	75647	0 300 600 900 1200	11.01 13.96 14.22 13.32 11.92	0.71 0.26 -0.53 0.89 1.45	-9242.00 -12942.00 -14042.00 -15493.45 -14068.17
76410	75647	0 300 600 900	12.57 14.41 14.47 11.52	0.46 -0.20 -0.34 4.35	-10842.00 -13500.00 -15500.00 -15614.63
76530	75647	0 300 600 900	13.64 14.35 14.01 11.85	0.21 -0.49 -0.25 2.07	-12242.00 -13500.00 -15500.00 -14591.77
76650	75647	0 300 600 900	13.99 14.48 12.44 11.73	0.10 -0.51 2.44 1.91	-13500.00 -14842.00 -15565.91 -13523.00
76770	75647	0 300 600	14.24 14.47 10.43	-0.38 -0.33 6.25	-13500.00 -15500.00 -15157.46
76890	75647	0 300 600	14.22 13.32 11.92	-0.53 0.89 1.45	-14042.00 -15493.45 -14068.17
77010	75647	0 300	14.47 11.52	-0.34 4.35	-15500.00 -15614.63
77130	75647	0 300	14.01 11.85	-0.25 2.07	-15500.00 -14591.77
77250	75647	0 300	12.44 11.73	2.44 1.91	-15565.91 -13523.00
77370	75647	0	10.43	6.25	-15157.46
77490	75647	0	11.92	1.45	-14068.17

C.2.2 CTAS3

This example illustrates how the lack of pilot intent information in the form of an ATC clearance can cause large trajectory prediction errors in the horizontal and vertical dimensions. It also shows how the CTAS trajectory synthesis can, for rather long periods (e.g. two to 10 minutes), not update the trajectory prediction. When the trajectory did not get updated, the trajectory prediction errors became very large: to 34 nautical miles in the horizontal to 19,000 feet in the vertical.

C.2.2.1 Track Data

The aircraft, Bae125, filed a Flight Plan from Meacham Field (FTW) and return, flying out to Abilene using the King3 for departure and Slugg4 for arrival back at FTW. However, the aircraft did not follow the filed Flight Plan. It climbed out to the west northwest to an altitude of 39,000 feet, made a big looping turn and came back to FTW.

The track data used for this aircraft began at the time 22:22:28 (80548 seconds) and was interpolated each ten seconds over the interval from 22:22:30 (80550 seconds) through 22:50:10 (82210 seconds). During this period the HCS supplied 240 track reports for this aircraft.

C.2.2.1.1 Time Adjustment

The time stamps assigned by CTAS were first rounded to the nearest second and then adjusted to 12 second intervals or to intervals of multiples of 12 seconds. Table C.2-3 shows the time intervals after rounding and before adjustment, after adjustment, and after correction processing.

Table C.2-3: Track Report Time Intervals for CTAS3

Gap Size (Seconds)	Count Before Adjustment	Count After Adjustment	Count After Processing
11	45	0	0
12	139	233	232
13	49	0	0
23	2	0	0
24	4	6	0
132	0	0	1

After the time adjustment there remained six gaps in the track data where one report was missing. All of these gaps were patched by interpolation. That is, six track reports were added to the track to fill in these small gaps. There were two instances in the track where the aircraft did not move between radar position reports. The XYZ values for these two track reports were replaced with interpolated values. There was one instance where the aircraft moved between reports, but for only a short distance (0.08 nautical miles). The XYZ values were replaced here also. The first two track reports were discarded because the altitude changed from 41,000 feet to 5300 feet. In one place in the track, adjacent track reports were inconsistent and the attempt to bridge the gap failed. Ten track reports were dropped and the track was re-initialized. Dropping the reports created a gap of 132 seconds in the track data. The track report correction processing deleted the first two reports, added six interpolated reports, filled the six 24 second gaps, and deleted 10 reports where the data was inconsistent. As a result, the 240 track reports, after correction processing, became 234 reports. The track as corrected then had one 132 second gap. In this study no more measurements are made on the track after such a break.

Figure C.2-7 presents a plot of the interpolated XY track data and the route as specified by the FP record. Figure C.2-8 presents the interpolated altitude track data plotted against time. The flight

plan indicates that the pilot's intent was to depart from Meacham Field (FTW), fly out to the Abilene fix (ABI) using the King3 departure and then return to FTW using the Slugg4 arrival. However, the recorded track data shows that this aircraft flew a route climbing to the northwest to an altitude of 39,000 feet, then made a clockwise turn and returned to FTW. Most likely, once the aircraft departed, ATC verbally allowed him to fly this new route, but CTAS had no knowledge of the route change. This led to large errors in the trajectory predictions.

C.2.3.2 Trajectories

Figure C.2-9 presents the track time line (labeled "Track") and the time line for 27 of the 41 trajectories recovered for this aircraft. Each of the trajectories is labeled with the trajectory's build time. The first sampling of the trajectory accuracy is shown in Figure C.2-9 by an arrow drawn from the track time line to the latest trajectory available at that sample time. The first sample starts 40 seconds after the time of the initial interpolated track, which in this example was 80590 seconds.

The trajectory sampled for the starting sample time (time = 80590 seconds) was the 80583 trajectory, since this was the latest trajectory available prior to the sample time. The first four trajectories are not used, since there was no track data available to associate these early trajectories. The sampling interval used in this study was 120 seconds. The trajectory used for the next sample time (time = 80590+120 = 80710 seconds) was also the 80583 trajectory, as it was until the sampling time of 81310 when the 81303 trajectory began to be used. This process of associating the last valid trajectory with a sample time was continued for the entire track. As a result six of the 41 trajectories were used: 80583, 81303, 81615, 81890, 82023 and 82119. The remaining trajectories were not used in the study since they were created for track points after the last available track point.

C.2.3.3 Metrics

The XY plots of these six trajectories are shown in Figure C.2-10 along with the interpolated track data. CTAS initially predicted a flight path following the Flight Plan. It then gave up on following the Flight Plan and predicted a series of return paths, each returning to FTW.

Besides the error due to the re-routing of this aircraft, this example illustrates a second, perhaps related, error source. Normally a CTAS trajectory is captured for each track point, but for this aircraft there were three time gaps where trajectories were not updated. The first gap occurred for 624 seconds between the 80583 and 81207 trajectories, the second occurred for 253 seconds between the 81303 and 81556 trajectories, and the third occurred for 213 seconds between the 81615 and 81818 trajectories.

Three of the 14 error measurements with a look ahead time of zero seconds were produced from three different sample trajectories (i.e. the 80583, 81303, and 81615 trajectories) with ages of 607, 247, and 175 seconds. These samples have horizontal errors of 14, 34, and 20 nautical miles and vertical errors of 18,900, 14,500, and 3,600 feet, respectively

The significance of these gaps is also shown in Figure C.2-11, which shows plots of the interpolated track XY and the uninterpolated trajectory XY position points for the 80583 trajectory. This figure also identifies the points at which trajectory metrics were calculated for sample time = 80590 seconds at look ahead times of zero, 300, 600, 900, 1200, and 1500. Figure C.2-12 shows the vertical trajectory metrics for the sample points on the 80583 trajectory. These metrics are presented, along with all the trajectory metrics calculated for this aircraft, in Table C.2-4.

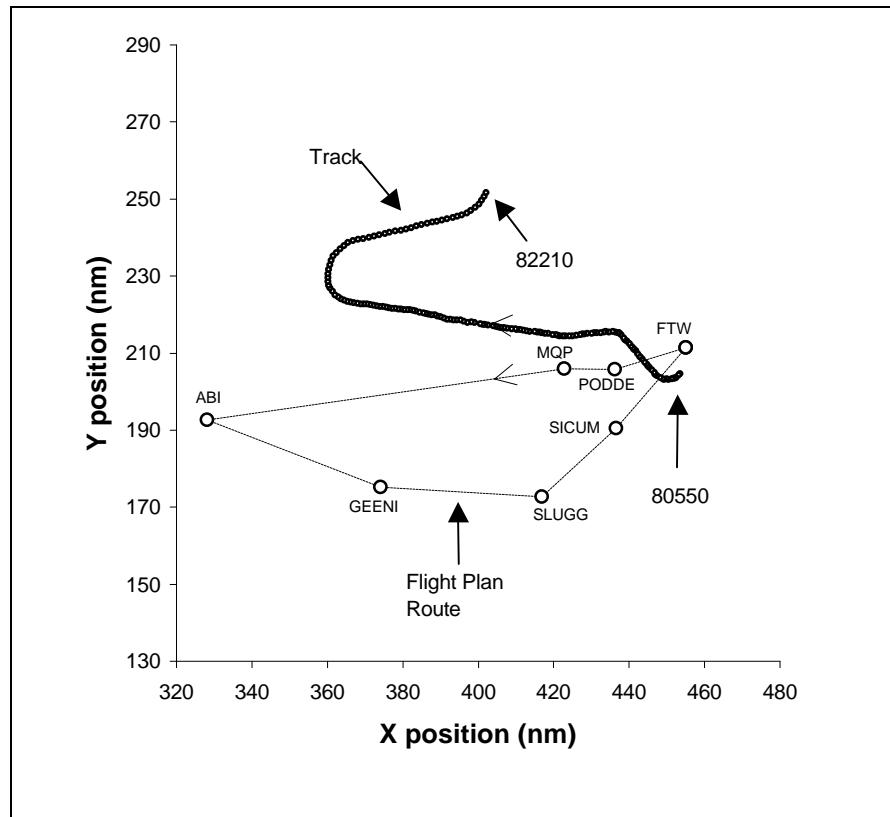


Figure C.2-7: Interpolated Track and Route XY Position

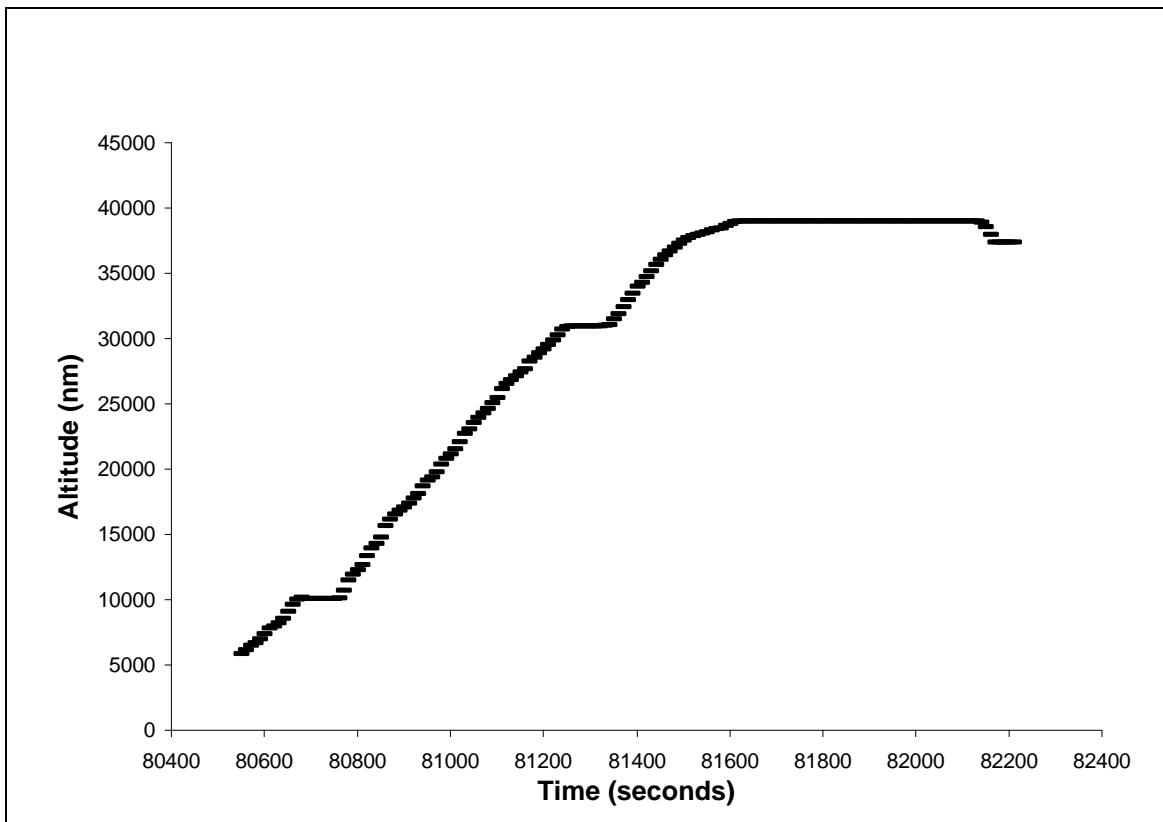


Figure C.2-8: Interpolated Track Altitude

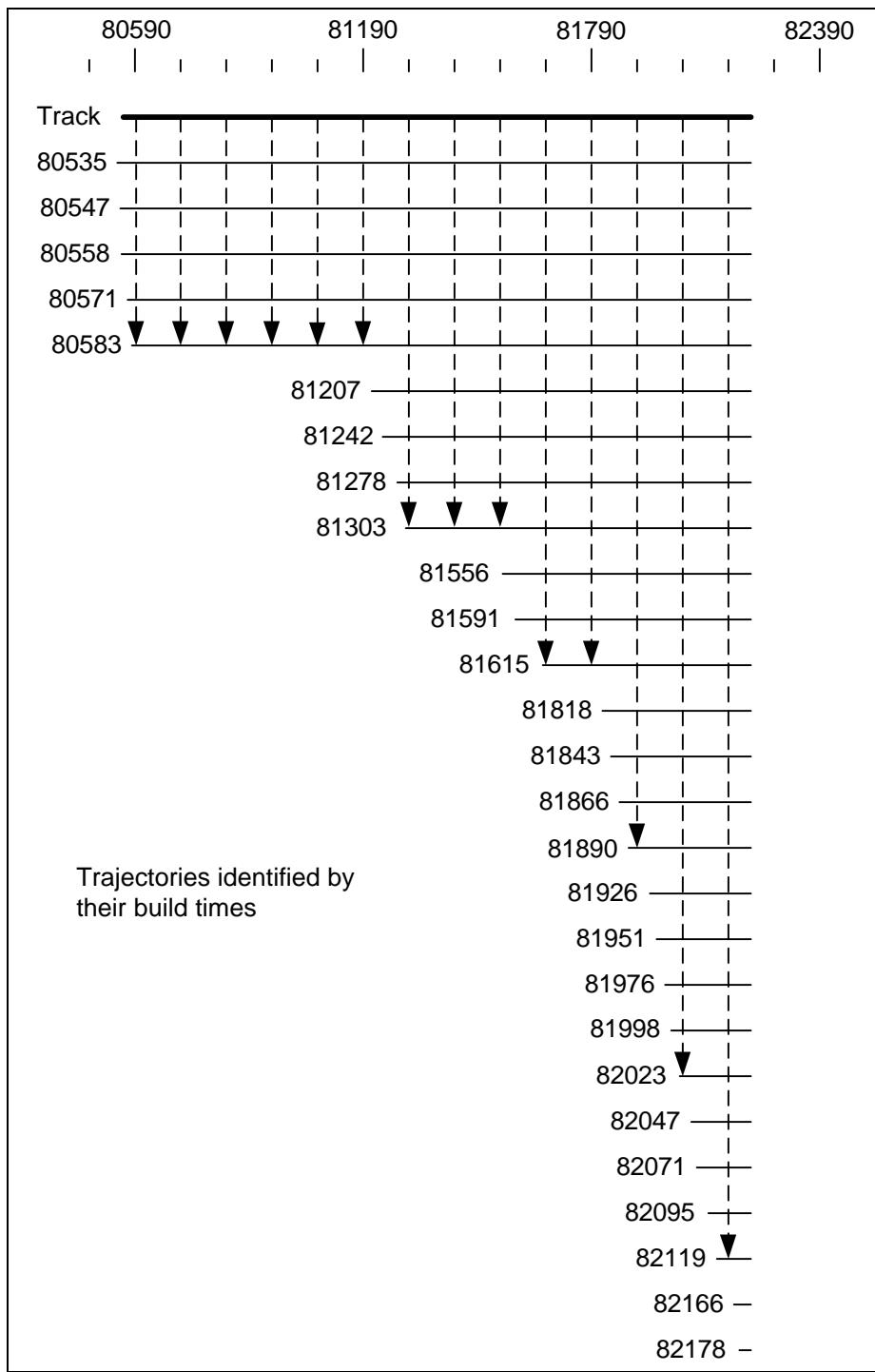


Figure C.2-9: Sampled Trajectories

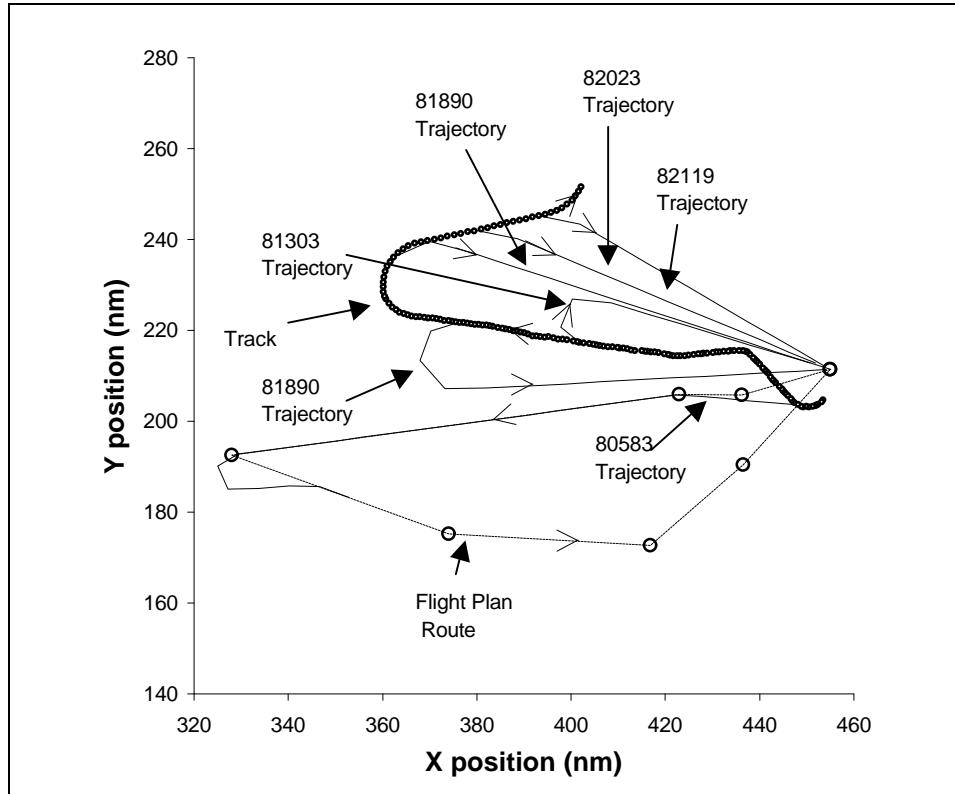


Figure C.2-10: Track, Sampled Trajectories, and Route

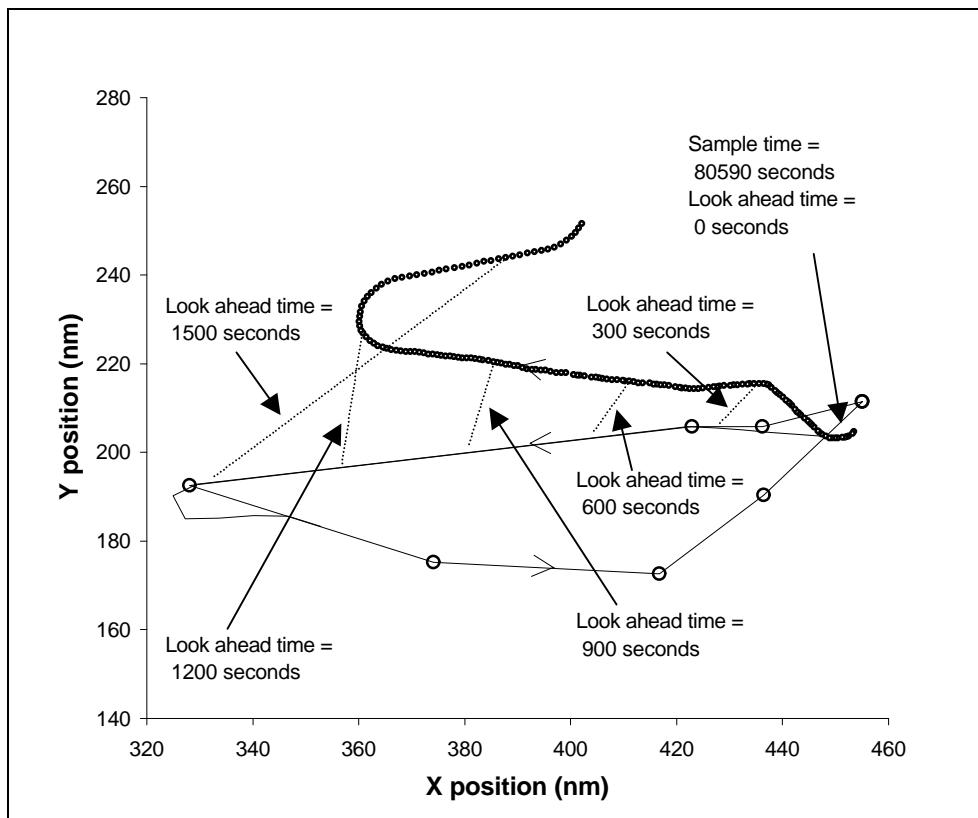


Figure C.2-11: Sampled XY Points Along 80583 Trajectory

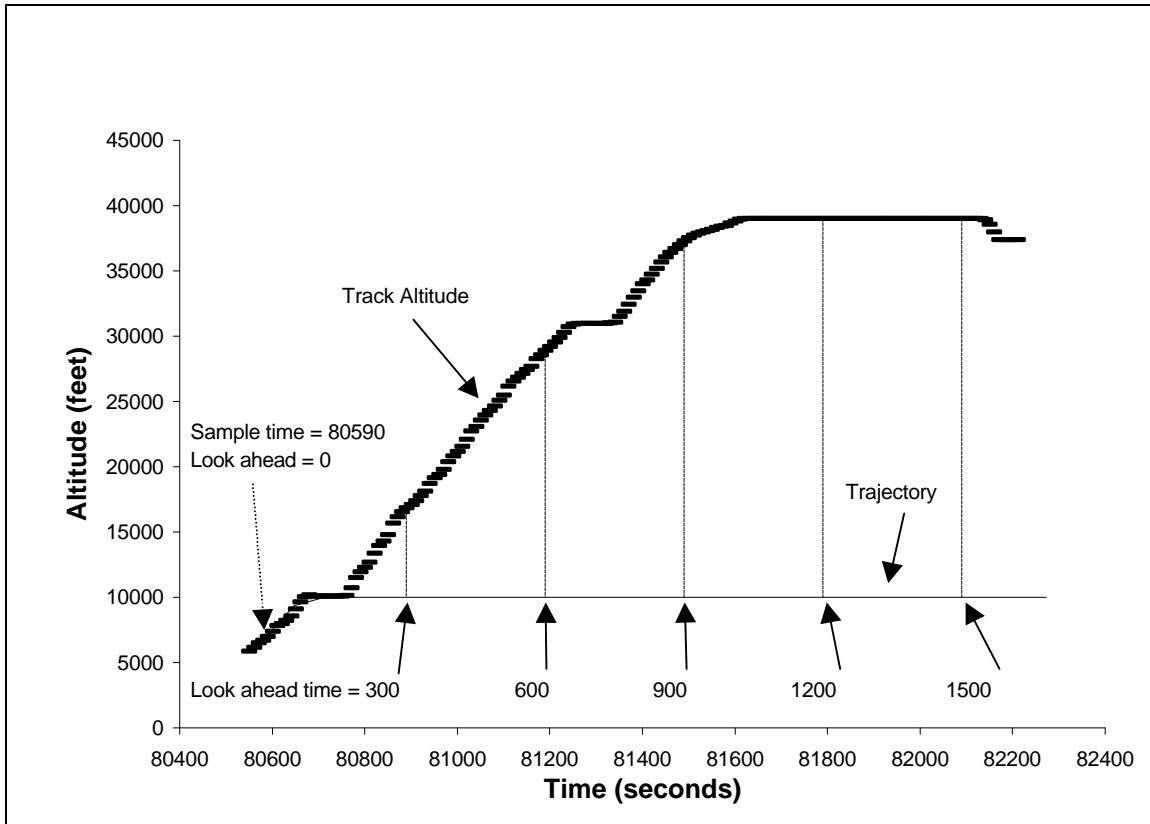


Figure C.2-12: Sampled Altitude Points Along 80583 Trajectory

Table C.2-4: Trajectory Metrics

Sample Time	Traj Build Time	Look Ahead Time	Long Error	Lat Error	Vert Error
80590	80583	0	-0.32	-0.04	-74.08
		300	-6.88	10.74	6840.00
		600	-8.59	11.40	18889.00
		900	-7.48	19.31	27290.00
		1200	-7.76	28.44	28990.00
		1500	-61.99	42.67	28990.00
80710	80583	0	-1.98	2.74	120.69
		300	-9.06	8.20	11539.00
		600	-8.26	14.24	20990.00
		900	-7.66	22.13	28940.00
		1200	-22.05	39.81	28990.00
80830	80583	0	-5.31	8.65	3940.00
		300	-8.67	10.11	16840.00
		600	-7.32	17.55	25190.00
		900	-7.33	24.98	28990.00
		1200	-48.76	41.78	28990.00
80950	80583	0	-7.07	9.94	9140.00
		300	-8.40	12.73	20940.00
		600	-7.50	20.95	28190.00
		900	-12.40	34.26	28990.00
		1200	-85.87	12.16	28590.00
81070	80583	0	-8.52	8.60	14290.00
		300	-7.69	15.94	22439.00
		600	-7.62	23.64	28990.00
		900	-35.19	41.15	28990.00
81190	80583	0	-8.59	11.40	18889.00
		300	-7.48	19.31	27290.00
		600	-7.76	28.44	28990.00
		900	-61.99	42.67	28990.00
81310	81303	0	-0.32	-0.14	1.08
		300	-43.26	13.70	17550.03
81430	81303	0	-10.48	5.70	6732.92
		300	-67.20	15.35	22145.94
81550	81303	0	-31.16	12.81	14477.60
		300	-87.99	9.03	26788.20
81670	81615	0	-1.02	2.18	0.00
		300	-20.07	-33.54	10277.69
81790	81615	0	-19.46	-3.27	3551.77
		300	-17.75	-36.48	14393.46
81910	81890	0	-0.17	-0.79	685.23
82030	82023	0	-0.13	-0.37	242.42
82150	82119	0	-0.81	-1.85	758.92